EPA/ROD/R05-00/089
2000

EPA Superfund
Record of Decision:

OTTAWA RADIATION AREAS
EPA ID: ILD980606750
OU 01
OTTAWA, IL
09/08/2000

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Ottawa Radiation Areas NPL-1, 4, 8, 9, and the Illinois Power Building, Ottawa, LaSalle County, Illinois.

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial actions for the Ottawa Radiation Areas NPL-1,4,8,9 and the Illinois Power Building sites in Ottawa, LaSalle County, Illinois. The remedies were chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and are consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) to the extent practicable. These decisions are based upon the contents of the Administrative Record for the site.

The State of Illinois does not concur with the remedies as described in **Section 12.0 Selected Remedies** of this ROD. However, see **Section 14.0 Documentation of Significant Changes,** for a fuller discussion of the State's position.

ASSESSMENT OF THE SELECTED REMEDY

The response actions selected in this Record of Decision (ROD) are necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

DESCRIPTION OF THE SELECTED REMEDY

This decision document addresses remediation of radioactive contaminated soils from four of the Ottawa Radiation Areas plus the Illinois Power Facility.

The major components of the selected remedies include:

NPL-1

- Excavate soil contaminated with radium-226 above 6.2 pCi/g and, if necessary, soils contaminated with organic and/or inorganic chemicals;
- backfill excavated areas with clean material; and
- dispose of the excavated contaminated material at a licensed radioactive material or off-site landfill in accordance with applicable federal and/or state regulations.

Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals. Additional sampling will be conducted as pre-design activities at NPL-1 to determine the extent of chemical contamination. If organic and/or inorganic chemical contamination requires further remediation beyond the area of defined radiological contamination, this Record of Decision (ROD) will be modified through either an Explanation of Significant Differences (ESD) or ROD Amendment as appropriate.

NPL-4

- Excavate soil contaminated with radium-226 above 6.2 pCi/g and, if necessary, soils contaminated with organic and/or inorganic chemicals;
- backfill excavated areas with clean material;
- process excavated soil to: (a) separate out the contaminated portion; and (b) reduce, to the extent practical, the volume of contaminated soil disposed off-site. This may be done using a segmented gate system, if that system is determined to be effective through pilot testing. If the pilot testing demonstrates that the segmented gate is not effective or will not result in cost savings, then the material may be manually separated instead to achieve volume reduction;
- dispose of the excavated contaminated material at a licensed radioactive material or off-site landfill in accordance with applicable federal and/or state regulations; and
- collection of perched water during excavation with treatment, if necessary, and discharge to the City of Ottawa's wastewater treatment system.

Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals. Additional sampling will be conducted as pre-design activities at NPL-4 to determine the extent of chemical contamination. If organic and/or inorganic chemical contamination requires further remediation beyond the area of defined radiological contamination, this Record of Decision (ROD) will be modified through either an Explanation of Significant Differences (ESD) or ROD Amendment as appropriate.

NPL-8

- Excavate soil contaminated with radium-226, above 6.2 pCi/g, down to a depth of 10 feet bgs;
- backfill excavated areas with clean material;
- process excavated soil to: (a) separate out the contaminated portion; and (b) reduce, to the extent practical, the volume of contaminated soil disposed off-site. This may be done using a segmented gate system, if that system is determined to be effective through pilot testing. If the pilot testing demonstrates that the segmented gate is not effective or will not result in cost savings, then the material may be manually separated instead to achieve volume reduction; and
- dispose of the excavated contaminated material at an off-site, licensed radioactive material landfill.

Some soils at the site contain, in addition to radiological contamination, organic and/or inorganic chemicals. Soils with radiological contamination below 6.2 pCi/g but with organic and/or inorganic chemicals present may need to be disposed of in an off-site landfill in accordance with applicable federal and/or state regulations. Sampling during the implementation of the remedial action should be conducted to determine whether soil meeting the radiological clean-up criterion needs to be disposed of at an off-site landfill in accordance with applicable federal and/or state regulations.

Land use after implementation will be restricted to recreational use and structures with slab on grade will be allowed with appropriate controls for radon gas. The State of Illinois, who owns the property at NPL-8, has indicated that it intends to limit future use of the property to recreational use and it will be responsible for enforcing the restrictions.

NPL-9

- Excavate soil contaminated with radium-226 above 6.2 pCi/g and, if necessary, soils contaminated with organic and/or inorganic chemicals;
- backfill excavated areas with clean material; and
- dispose of the excavated contaminated material at a licensed radioactive material or off-site landfill in accordance with applicable federal and/or state regulations.

Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals. Additional sampling will be conducted as pre-design activities at NPL-9 to determine the extent of chemical contamination. If organic and/or inorganic chemical contamination requires further remediation beyond the area of defined radiological contamination, this Record of Decision (ROD) will be modified through either an Explanation of Significant Differences (ESD) or ROD Amendment as appropriate.

Illinois Power Building

Soil contaminated with radium-226 will be excavated and disposed off-site at a licensed radioactive material landfill in conjunction with the excavations at the other sites. U.S. EPA would conduct radon monitoring in the Illinois Power building, which lies adjacent to the excavated area, to determine if radon levels exceed permissible levels. If radon levels persist then a radon reduction system will be operated in the building and additional testing may need to be performed.

Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals. Additional sampling will be conducted as pre-design activities at the Illinois Power site to determine the extent of chemical contamination. If organic and/or inorganic chemical contamination requires further remediation beyond the area of defined radiological contamination, this Record of Decision (ROD) will be modified through either an Explanation of Significant Differences (ESD) or ROD Amendment as appropriate.

STATUTORY DETERMINATIONS

The selected remedies are protective of human health and the environment; comply with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action; and are cost-effective. The remedies utilize permanent solutions and alternative treatment technologies to the maximum extent practicable for each site. The remedies in this ROD do not satisfy the statutory preference for treatment as a principal element in the remedies. U.S. EPA has determined that the radium-226 contamination does not meet characteristics of materials requiring treatment as described in OSWER Directive 9380.3-06FS entitled "A Guide to Principal Threat and Low Level Threat Wastes". Therefore, options utilizing a combination of off-site disposal and institutional controls were selected.

Because the remedy selected for NPL-8 will result in hazardous substances remaining on-site above levels that allow for unlimited and unrestricted exposure, a review will be conducted within five years after initiation of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the **DECISION SUMMARY** section of this ROD. Additional information can be found in the Administrative Record for this site.

- The main chemical of concern at all the Ottawa Radiation Areas is radium-226. Concentrations of radium-226 in soils varied from site to site, but were detected as high as 844 picoCuries/gram (pCi/g) at a depth of 9-11 feet below ground surface (bgs) at NPL-8. Inorganic and organic contaminants were also found in soils at all the sites. However, chemical sampling was limited to the areas of suspected radiological contamination. Therefore, at NPL-1, 4, 9, and Illinois Power the extent of chemical contamination will be determined by additional sampling prior to the remedial design. For NPL-8 and most of the NPL-4 site, chemical contamination is co-located with the radiological contamination and will be addressed as part of the remedy during excavation of the landfilled areas.

- Baseline risk at the sites was largely dependent on future land use assumptions, mainly because risks for current land use scenarios were minimal. Currently, the sites are either open lots or empty buildings and risks to trespassers was the most reasonable current scenario. Since most of the contamination was found at depth the risks to trespassers were within or below U.S. EPA's risk range. However, risks for the most reasonable future land use scenarios, residential for the privately owned properties at NPL-1,4,9 and Illinois Power and recreational for the state owned property at NPL-8, were as high as $2x10^{-1}$ for future residential use at NPL-4. In addition, U.S. EPA examined risks associated with future commercial/industrial and future construction worker scenarios. Risks were predominantly a combination of exposure to radium-226 in soils and its byproduct radon gas in enclosed structures.

- Risks posed by current and future groundwater use are limited. The Ottawa area has naturally occurring radium contamination that is treated by the municipal water system.

The investigation found little or no evidence that the sites were a potential source of contamination of the municipal water supply. In addition, for those sites, NPL-1,9 and Illinois Power, within the city limits, residents are supplied with water. NPL-4 and 8 outside the city limits have no current groundwater usage and any possible future use will be addressed by the remedies. Perched water was found at some sites at the landfill/native soil interface but limited volumes preclude use as a water source.

- The clean-up standard for soils contaminated with radium-226 at the Ottawa Radiation Areas is based in part on 40 C.F.R. Part 192, Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings as a potential relevant and appropriate requirement. The standard was excavation and disposal of material greater than 6.2 pCi/g, or 5 pCi/g above a background level of 1.2 pCi/g established in the Ottawa area. Supplemental standards under Subpart C of 40 CFR 192 were established for contaminated soils remaining below 10 ft bgs at NPL-8 due to the U.S. EPA's belief that these materials do not pose a clear present or future hazard and improvements could only be achieved at unreasonably high cost. Please see **Section 8.1 Soil Clean-up Level for Radium-226** for additional details. If the pre-design sampling indicates organic and/or inorganic chemicals are present outside the areas of radiological contamination at levels above a 1E-04 risk and/or a Hazard Index greater than one, then further remediation of the soils would be required. A clean-up standard would be developed as pre-design activities and an ESD or ROD Amendment, as appropriate, prepared to document the organic and/or inorganic soil clean-up standards to be used at the sites.

- Estimated capital costs, operation and maintenance (O&M) costs, and total present worth costs are $45,000,000 for all five sites. For NPL-8 which is the only site where the selected remedy has associated O&M costs, a discount rate of 7% was estimated and costs were projected over a period of thirty years.

- Future land use played a critical and decisive role in remedy selection for all of the sites. Potential residential future land use at NPL-1,4,9, and Illinois Power and the lack of effective technologies for treating radioactive soils limited the comparison of remedial alternatives for these sites to basically no-action versus complete excavation. Future recreational land use at NPL-8 allowed for development of more alternatives, but the specific future plans of the State of Illinois for the property preclude capping options and any excavations of less than 10 feet. Comparison of a 10-foot excavation and complete excavation for NPL-8, showed that the alternatives were basically equivalent in terms of the nine criteria. The 10-foot excavation proved to be the less costly of the two and therefore more cost-effective.

9/8/00
DATE

Wm. E. Muno
William E. Muno
Superfund Division Director

U.S. EPA Superfund
Record of Decision

Ottawa Radiation Areas NPL-1, 4, 8, 9, and Illinois Power

Ottawa, LaSalle County, Illinois
August, 2000

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DECISION SUMMARY

1. Site Name, Location, and Brief Description

The Ottawa Radiation Areas, NPL-1, 4, 8, 9, CERCLIS identification number ILD980606750, and the Illinois Power site are within and just outside the city limits of Ottawa, LaSalle County, Illinois (Figure 1). The United States Environmental Protection Agency (U.S. EPA) has been the lead for all activities to date.

NPL-1 is an area of approximately 5 acres within the Ottawa city limits. It consists of several parcels of land located at the intersection of Lafeyette and Guion Streets. To the north, the site is bordered by several residences located on Lafayette Street; to the west, by residences located on Post Street and property owned by the YMCA; to the south, by the Fox River; and to the east, by the Marquette High School athletic field (Figure 2).

NPL-4 is 4.3 acres in area, on Canal Road approximately one quarter mile east of the Ottawa city limits. It consists of two parcels of land, one owned by the Illinois Department of Nuclear Safety (IDNS) and one privately owned. Canal Road borders the site to the north, a residence borders the site to the east, and vacant properties border the site to the south and west (Figure 3).

NPL-8, which covers approximately 17 acres, is on State Highway 71 about one mile east of the Ottawa city limits. The site was originally acquired by the Illinois Department of Public Works and Buildings in 1937. Jurisdiction over the property was transferred to the Illinois Department of Conservation (IDOC) in 1951 and then to IDOC's successor agency the Illinois Department of Natural Resources in 1995. Finally, in August 1999 jurisdiction of the property was transferred to the Illinois Department of Nuclear Safety (IDNS) for the duration of the remediation of the site. It is bordered by a defunct landscaping company and State Highway 71 on the southeast, a car dealership on the south and southwest, the Fox River on the northwest, and water-filled clay pits on the northeast (Figure 4).

NPL-9 consists of two parcels of land, totaling approximately 1.9 acres in area, within the Ottawa city limits. One parcel, at the northwest corner of the intersection of Marquette and Chestnut Streets is owned by Etna Oil Company. This parcel is bordered on the east and south by Chestnut Streets, respectively, to west by residences, and to the north by rail road tracks. The second parcel is a much smaller piece approximately 500 feet south of the large parcel, just west of Chestnut Street, on the Illinois and Michigan (I&M) Canal towpath, and is owned by the Illinois Department of Natural Resources (IDNR) (Figure 5).

The Illinois Power (IP) site is a 1.5 acre property within the Ottawa city limits. The site is at the corner of Jefferson and Fulton Streets in the central business district. The site is bordered by Jefferson Street to the south, Canal Street and a city parking lot to the west, Jackson Street to the north, and Fulton Street to the east (Figure 6).

2. Site History and Enforcement Activities

The contamination at these sites is the result of activities associated with two radium dial painting companies: the Radium Dial Company, which operated in Ottawa from 1920 through 1932, and Luminous Processes, Inc. (LPI), which operated in Ottawa from 1932 through 1978. The source of contamination is radium sulfate paint that Radium Dial and LPI used in their dial painting operations. During the course of operations at these companies, their equipment, materials, buildings, and surrounding work areas became contaminated with radium-226, the major isotope of radium sulfate. Through the years, contaminated operational waste from both companies was used as fill material at various landfills throughout the Ottawa area, including the areas known as NPL-1, 4, 8, and 9. The IP site was adjacent to the LPI facility and may have received contaminated fill or residual waste from the LPI building. Debris from the demolition of the Radium Dial facility, which occurred in 1968, was probably also buried at one or more landfills in the area. The LPI building was also demolished in 1985, but the demolition was conducted by a contractor to the Illinois Department of Nuclear Safety (IDNS). Contaminated debris from this demolition was disposed of at a licensed radioactive disposal facility.

Initially, U.S. EPA and the State of Illinois discovered 14 areas in and around Ottawa with radioactive contamination and subsequently targeted them for clean-up. On July 29, 1991, U.S. EPA added the 14 Ottawa Radiation Areas, including NPL-1, 4, 8, and 9 to the National Priorities List (NPL). The NPL is a list of sites in the country that are eligible for study and clean-up, if necessary, under the Superfund program. Of the fourteen areas, U.S. EPA prioritized residential properties and properties near residential areas because they posed a greater imminent and substantial endangerment to the public. U.S. EPA excavated these residential areas, including parts of NPL-1 and NPL-9 as a Superfund removal action. However, U.S. EPA did not complete these removals because of (a) the pervasiveness of the landfilled wastes; (b) the cost, approximately $35 million; and (c) the amount of time needed to complete the removal action, almost four years, far exceeded the limits of the Superfund removal program. Since the residential areas that posed a greater imminent and substantial endangerment had been addressed under the Superfund removal program, U.S. EPA investigated the sites where clean-up activities were not completed, including NPL-1, 4, and 9, as well as some peripheral areas and areas where complete closure was not achieved, under the Superfund remedial program. Here additional funds could be secured to perform investigations, risk assessments and clean-up actions. U.S. EPA has always designated the clean-up of NPL-8 under the Superfund remedial program. U.S. EPA discovered the Illinois Power site during the initial Superfund removal actions. U.S. EPA discovered radon gas, a byproduct of radium-226, in the IP building and conducted a surface radiation survey and soil sampling which showed elevated levels of radium-226. Although actions were not taken at IP as part of the Superfund removal, U.S. EPA designated the site as an area of concern with follow-up needed.

The U.S. EPA has recently provided general notification to a potentially responsible party (PRP) at NPL-8, and is searching for other PRPs. U.S. EPA has not identified any other PRPs for the thirteen other areas or the IP site. Since we only recently identified and notified the PRP at the

NPL-8 site, the U.S. EPA conducted and funded the remedial investigation/feasibility study (RI/FS). Negotiations for the clean-up of the NPL-8 site, including the remedial design/remedial action (RD/RA), are currently underway. For the other sites, U.S. EPA has taken the lead and conducted the removal and additional site characterizations. At this time, U.S. EPA will continue to be the lead agency for the clean-up at these sites although as discussed further in Section 13.0, the State of Illinois has proposed that it assume the responsibility of the lead agency.

U.S. EPA conducted removal activities between 1993 and 1997. We began the RI, risk assessment (RA), and FS for NPL-8 in 1996 and completed them in June 1999. In addition, U.S. EPA began investigations, risk assessments, and engineering evaluations/cost analyses for NPL-1, 4, and 9 in 1997 and also completed these in June 1999.

3. Highlights of Community Participation

U.S. EPA established an information repository at the Reddick Library, 1010 Canal Street, Ottawa, Illinois. U.S. EPA maintains a copy of the administrative record for the site in the information repository. U.S. EPA made available a Proposed Plan on February 9, 2000. We held a public meeting on February 24, 2000, to discuss the Proposed Plan. EPA placed advertisements in local newspapers to announce the public meeting and comment period. A public comment period for the Proposed Plan was established from February 9, 2000 to March 9, 2000. U.S. EPA granted a thirty day extension to April 8, 2000. An additional extension to April 27, 2000 was also granted. The public generally supports the selected remedies. There were several comments expressed on the remedy selected for NPL-8. Some were in favor of the proposal, others were not. U.S. EPA thoroughly weighed and examined all comments in conjunction with the nine evaluation criteria before making a final decision. The responsiveness summary is contained in Appendix A.

The public participation requirements of sections 113(k)(2)(B) and 117 of CERCLA, 42 U.S.C. §§ 9613(k)(2)(B) and 9617, have been met in the remedy selection process. This decision document presents the selected remedies for the Ottawa Radiation Areas NPL-1,4,8, 9, and the IP Superfund sites, chosen in accordance with CERCLA, as amended by SARA, and to the extent practicable, the NCP. The decision for these sites is based on the Administrative Record.

4. Scope and Role of Operable Unit

U.S. EPA has determined that excavation and off-site disposal of radioactive contaminated soils is necessary at the Ottawa Radiation Areas and IP Superfund sites. This decision is based on an analysis of site risks, described in detail below. The decision relies on the indications that the radioactive soils may pose risks to potential future residential, commercial, industrial, or recreational users at the sites.

Some soils at the sites contain, in addition to radiological contaminants, organic and/or inorganic chemicals. Additional sampling will be conducted as pre-design activities at NPL-1, 4, 9, and the IP site to determine the extent of chemical contamination. If organic and/or inorganic chemical contamination requires further remediation beyond the area of defined radiological contamination, U.S. EPA will modify this Record of Decision (ROD) through either an Explanation of Significant Differences or ROD Amendment as appropriate.

Because hazardous substances will remain at NPL-8, U.S. EPA will conduct a five-year review in accordance with Section 121 of CERCLA to assess whether any other remedial actions are necessary.

5. Site Characteristics

The City of Ottawa lies in the Illinois Valley. Regionally, the geology of the Ottawa area is primarily composed of bottomland or Wisconsinan glacial deposits, overlying Pennsylvanian-or Ordivician-aged bedrock. The glacial deposits vary from 10 to 100 ft thick in the area. Most of the area is underlain by the Ordivician-aged St. Peter Sandstone, which varies in thickness between 150 to 175 ft. Below the St. Peter Sandstone are shales and sandstones of the Cambrian System, including the 160 to 200 ft thick Galesville Sandstone.

The regional aquifer in the area is the St. Peter Sandstone. Regional transmissivities for the St. Peter of greater than 20,000 gallons per day per foot have been reported and vary according to localized thickness. However, the City of Ottawa currently supplies city residents with municipal water from four large-volume wells screened in the Galesville Sandstone between 1,180 to 1,220 ft below ground surface. Higher groundwater flow rates have been reported for the Galesville than for the St. Peter. No indication of a confining layer exists between the two aquifers. There are some residents who live outside the city limits that use private drinking water wells in the St. Peter Sandstone. These private drinking water wells were sampled as part of the remedial investigation for NPL-8. Ground water was sampled at all of the areas, except the Illinois Power site.

An interesting note is that the concentration of radium in Ottawa’s groundwater is historically high due to elevated levels of naturally-occurring radium in both the Galesville and St. Peter Sandstone aquifers. In the City of Ottawa water supply, an average radium concentration of 6.2 picoCuries per liter (pCi/L) has been reported. This concentration exceeds the U.S. EPA maximum allowable concentration of 5.0 pCi/L. Ottawa received a variance from restricted status from the Illinois Environmental Protection Agency (IEPA) in 1986.

LaSalle County and the City of Ottawa lie in the drainage basin of the Illinois River, the master stream of this region. The Illinois River flows across the county in a westward direction. The important tributaries in this area are the Vermillion, Little Vermillion, and the Fox Rivers.

The Ottawa area is located in the Grand Prairie Section of the Grand Prairie Natural Division of Illinois. The Grand Prairie Division is a vast plain formerly occupied by tall-grass prairie. Forest bordered the rivers, and there were occasional groves on moraines and glacial hills.

Approximately 20,350 people live within a 3-mile radius of the City of Ottawa. However, the population within a one-mile radius of the some of the sites, especially NPL-4 and 8 on the outskirts of town, is limited.

Onsite work conducted during the RI and site characterizations included sampling of soil, groundwater, sediment, and surface water. Because radioactivity is considered the primary threat at the site, U.S. EPA determined that sampling would concentrate on analyzing for radioactivity with only limited sampling for chemical constituents. We also characterized onsite sources of contamination at the sites through the review of historical records, a topographical survey, geophysical surveys, and radiation surveys. The Toxicity Characteristic Leaching Procedure (TCLP) was also conducted on some soil samples for the purpose of evaluating off-site disposal options as part of the remedial alternatives.

U.S. EPA established screening levels for contaminants based on the most conservative, risk-based values. For radiological contaminants in soils, U.S. EPA defined the screening level as the clean-up level established as part of the earlier U.S. EPA Superfund removal activities, 5 pCi/g above a background level of 1.2 pCi/g, or 6.2 pCi/g. Additional information on the radiological clean-up level established for future Superfund remedial actions at the remaining radiations areas is provided in Section 8.0. For organic and/or inorganic contaminants in soil, U.S. EPA used values obtained from the Tiered Approach to Corrective Action Objectives (TACO) Tier 1 soil remediation objectives; U.S. EPA Region III risk-based concentrations; and the U.S. EPA Soil Screening Guidance. For ground water U.S. EPA utilized Illinois Class I groundwater quality standards as well as U.S. EPA Maximum Contaminant Levels for screening levels.

The specific key findings of the RI and site characterizations for each site are summarized below.

5.1 Site Conditions

5.1.1 NPL-1

Physical Features

1. Geology

Data from soil borings at NPL-1 indicate three distinct strata underlie the site: the top layer consists of fill material; the middle layer consists of river silts and sands; and the bottom layer is bedrock (St. Peter Sandstone).

2. Hydrogeology

The bedrock St. Peter sandstone acts as a groundwater aquifer in the area. The river silts and sands of the middle layer appear to be semi-confining at various locations throughout the site, limiting direct communication between the fill layer and the St. Peter Sandstone. Depths to the St. Peter Sandstone at three installed groundwater monitoring wells range from 27 to 32 feet bgs. The groundwater flow direction in the aquifer is estimated to be to the south/southwest, towards the Fox River. The average linear velocity of groundwater in the St. Peter in this area was calculated to be approximately 60.59 ft/year.

Perched water was encountered in small localized units at the fill/native soil interface. The perched water is not laterally extensive and the volume varies greatly, depending on conditions.

Well records from the Illinois State Geological Survey (ISGS) show a total of 16 groundwater wells registered within a 1-mile radius of the NPL-1 site, 12 wells are residential and 4 are municipal. Most of the residential wells are screened in the St. Peter from 80 to 240 ft below ground surface (bgs); however, many of these wells may not be in use because the Ottawa city municipal wells supply drinking water to city residents.

3. Hydrology

The NPL-1 site is located along the Fox River approximately ½ mile northeast (upstream) from the confluence of the Fox and Illinois Rivers. Lower elevations at the site are well within the flood plain at an elevation of 460 ft and would be expected to flood on a yearly basis. The northern portion of the site is at an elevation of approximately 470 ft and is known to flood only during years of above average precipitation.

Natural surface drainage patterns have been altered by landfill and construction activities. Overland flow is currently channeled to the Fox River by several ditches and ravines, so surface run-off is primarily towards the Fox River.

4. Ecology

Land habitats at the NPL-1 site include open fields and deciduous woods. Various deciduous trees are scattered throughout the site, with higher density along the river and in the ravines. Signs of rabbit, raccoon, and squirrel have been observed on the site grounds. Other site inhabitants include various songbirds, small mammals, reptiles, and amphibians common to northwest Illinois.

The portion of the Fox River near the site is classified as an Illinois Natural Area Inventory site. The National Wetlands Inventory classifies the Fox River as a lower perennial riverine system with an unconsolidated bottom that is permanently flooded. Sport fish in the Fox River include channel catfish, carp, muskellunge, and small mouth bass. A state-threatened fish, *Moxostoma carinatum* (river redhorse), was found to be a common inhabitant in this section of the Fox River during a 1991 survey.

5. Contamination

Due to the configuration of the investigative area and the associated land use of the various properties at NPL-1, U.S. EPA divided the site into three smaller study areas (Areas A, B, and C). These areas are shown in Figure 2.

a) Soils

During the period from 1995 through 1997, the U.S. EPA removal program excavated and disposed of contaminated soil at this site. This action resulted in the removal of a total of 12,040 tons, or approximately 9,000 cubic yards (cy) at NPL-1. However, U.S. EPA terminated excavation activities at approximately 6 to 8 feet bgs due to depletion of removal action funds and we backfilled the site with clean soil to grade. Based on radiation surveys conducted by the Illinois Department of Nuclear Safety (IDNS) prior to termination of removal actions, the IDNS and the U.S. EPA suspected that there were additional areas of radium-contaminated soil. U.S. EPA later decided to investigate the site in the Superfund remedial program to allow further characterization and continue clean-up efforts at NPL-1.

As part of the additional investigative efforts, U.S. EPA advanced 55 subsurface soil borings in Areas A, B, and C at NPL-1 to depths ranging from six to 26 feet bgs. U.S. EPA retained one soil sample for radiological analysis at each boring location. We conducted organic analysis for samples at three borings and inorganic analysis for samples at eleven borings.

Subsurface investigation in Area A consisted of 35 soil borings. Radiological analysis of soil samples collected from these borings indicate the presence of radium-226 at concentrations ranging from 0.41 to 11.1 picoCuries per gram (pCi/g). The highest concentration of radium-226 (11.1 pCi/g) in Area A was detected in a subsurface sample collected at a depth of 5.5 to 7.0 ft bgs. A pea-sized fragment with a concentration of 133,000 pCi/g was found in one sample and because of its high concentration, U.S. EPA removed the fragment and disposed of it at a proper facility. We detected no other concentrations above 0.72 pCi/g in the sample.

Subsurface investigation in Area B consisted of nine soil borings. Radiological analysis of samples collected from these borings indicate the presence of radium-226 at concentrations ranging from 0.23 to, 10.7 pCi/g. The highest concentration of radium-226 (10.7 pCi/g) in Area B was detected in a subsurface sample collected at a depth of 5.5 to 6.5 feet bgs.

Subsurface investigation in Area C consisted of 11 soil borings. Radiological analysis of samples collected from these borings indicate the presence of radium-226 at concentrations ranging from 0.23 to 1.48 pCi/g. The highest concentration of radium-226 (1.48 pCi/g) in Area C was detected in a subsurface sample collected at a depth of 3.0 to 4.0 feet bgs.

U.S. EPA estimates the volume of contaminated soil in Areas A and B to 820 cubic yards (cy)

Using the results of the soil borings and radiation surveys performed during the investigation, U.S. EPA estimated the area of contaminated soils potentially requiring excavation. The estimated areal extent of radium contamination for NPL-1 is shown on Figure 2.

U.S. EPA also analyzed samples collected from three borings in Areas A and B for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and pesticides/PCBs. U.S. EPA also collected and analyzed eleven soil samples from Areas A, B, and C for inorganic chemicals. The only organic contaminants found above screening levels were SVOCs. These contaminants included benzo(a)anthracene, benzo(a)flouranthene, and benzo(a)pyrene. Inorganic contaminants found above screening levels included arsenic, beryllium, cadmium, iron, and lead. Analysis for TCLP metals indicated that barium, lead, and cadmium had detectable leachate concentrations. U.S. EPA limited sampling to assess organic and/or inorganic contamination at the NPL-1 site to the areas of radiological contamination. Additional sampling is needed to determine if organic and/or inorganic contamination extends beyond this area. The sampling will be done as pre-design activities.

b) Surface Water and Sediment

Because of the proximity of NPL-1 to the Fox River, U.S. EPA collected surface water and sediments samples and analyzed for radium-226. U.S. EPA collected five surface water and sediment samples, one upstream, three adjacent to the site, and one downstream. In the surface water samples, U.S. EPA detected a concentration of 2 picoCuries per liter (pCi/L) in the upstream sample, 2.9 and 2.4 pCi/L in two of the adjacent samples, and non-detect in the other adjacent sample and the downstream sample. In the sediment samples, U.S. EPA detected a concentration of .28 pCi/g in the upstream sample, concentrations ranged from .25 to .28 pCi/L in the samples adjacent to the site, and the downstream sample had a concentration of .59 pCi/g.

c) Ground Water

U.S. EPA installed and sampled three monitoring wells, screened in the St. Peter Sandstone. Well depths ranged from 43 to 46 feet bgs. U.S. EPA installed MW01 upgradient, MW02 downgradient, and MW03 side-gradient. U.S. EPA collected unfiltered samples from each of the wells and analyzed for radiological and chemical parameters. Results indicate the presence of radium-226 in each of the wells at concentrations ranging from 4.9 to 12.2 pCi/L. The lowest concentration of radium-226 was detected in the upgradient well MW01 and the highest was detected in the side-gradient well MW03. U.S. EPA also analyzed groundwater samples for VOCs, SVOCs, and inorganics. U.S. EPA detected only one VOC, 1,2-dichloroethane at a concentration of 12 micorgrams/liter (Fg/L). SVOCs were not detected in any of the groundwater samples. Numerous metals were detected but none exceeded U.S. EPA's maximum contaminant levels (MCLs) for drinking water. Because of the semi-confining layer at NPL-1 and the naturally occurring radium contamination in groundwater, U.S. EPA believes that the contamination in groundwater is not the result of site conditions.

d) Perched Water

Perched water was encountered at NPL-1 as the result of water percolating down through the fill material and trapped at the semi-confining layer. However, the perched water was found in small localized units and is not laterally extensive. Perched water was not sampled at NPL-1.

5.1.2 NPL-4

Physical Features

1. Geology

Data from soil borings at NPL-4 indicate four distinct strata underlie the site: the uppermost layer consists of fill material; the second layer consists of river silts and sands; the third layer is shale bedrock; and the bottom layer is bedrock (St. Peter Sandstone).

2. Hydrogeology

The bedrock St. Peter Sandstone acts as a groundwater aquifer in the area. The river silts and shale bedrock appear to be semi-confining at various locations throughout the site, limiting direct communication between the fill layer and the St. Peter Sandstone. Depths to the St. Peter Sandstone at three installed groundwater monitoring wells range from 10 to 20 feet bgs. The groundwater flow direction in the aquifer is estimated to be to the east. The average linear velocity of groundwater in the St. Peter in this area was calculated to be approximately 1.54 ft/year.

Perched water was observed at the interface of the fill material and the river silts and shale bedrock. The silts and shales appear to be acting as an aquitard to water percolating through the coarse fill material. However, the silts and shale bedrock also appear to be preventing direct communication between the perched water and the St. Peter Sandstone.

Well records from the Illinois State Geological Survey (ISGS) show a total of 17 groundwater wells registered within a 1-mile radius of the NPL-4 site. Most of the wells are screened in the St. Peter from 70 to 202 ft bgs; however, many of these wells may not be in use because the Ottawa City municipal wells supply drinking water to city residents approximately ½ mile to the west.

3. Hydrology

The NPL-4 site is approximately one mile northeast (upstream) from the confluence of the Fox and Illinois Rivers. Lower elevations at the site are at an elevation of 477 ft and would not be expected to flood on a yearly basis; however, the site is within the 100-year flood zone.

Natural surface drainage patterns have been altered by landfilling and construction activities. Overland flow is minimal due to relatively flat topography. A drainage ditch alongside Canal Road is capable of receiving and transporting run-off during intense precipitation.

4. Ecology

Land habitats at the NPL-4 site include open fields and deciduous woods. Open field habitat is found in the center of the property, with various grasses present. Signs of deer, rabbit, raccoon, and squirrel have been observed on the site grounds. Other site inhabitants include various songbirds, small mammals, reptiles, and amphibians common to northwest Illinois. No signs of endangered species were noted.

5. Contamination

Due to the configuration of the investigative area and the associated land use of the various properties at NPL-4, U.S. EPA divided the site into two smaller study areas (Areas A and B). These areas are shown in Figure 3.

a) Soils

As part of the additional investigative efforts, U.S. EPA advanced 40 subsurface soil borings in Areas A and B at NPL-4 to depths ranging from four to 18 feet bgs. U.S. EPA retained one soil sample for radiological analysis at each boring location. We conducted organic analysis for samples at three borings and inorganic analysis for samples at ten borings.

Subsurface investigation in Area A consisted of 27 soil borings. Radiological analysis of soil samples collected from these borings indicate the presence of radium-226 at concentrations ranging from 0.47 to 591 picoCuries per gram (pCi/g). U.S. EPA estimates the volume of radium contaminated soil in Area A to be 12,700 cy.

Subsurface investigation in Area B consisted of thirteen soil borings. Radiological analysis of samples collected from these borings indicate the presence of radium-226 at concentrations ranging from 0.7 to 66.6 pCi/g. U.S. EPA estimates the volume of radium contaminated soil in Area B to be 2,200 cy.

Using the results of the soil borings and radiation surveys performed during the investigation, U.S. EPA estimated the area of contaminated soils potentially requiring excavation. The estimated areal extent of radium contamination for NPL-4 is shown on Figure 3.

U.S. EPA also analyzed samples collected from three borings in Areas A and B for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and pesticides/PCBs. U.S. EPA also collected and analyzed ten soil samples from Areas A and B for inorganic chemicals. The only contaminants found above screening levels were inorganic chemicals. Inorganic contaminants found above screening levels included arsenic, beryllium, cadmium, iron, lead, nickel and thallium. Although U.S. EPA only collected a limited number of samples to assess organic and inorganic contamination at NPL-4, U.S. EPA believes that the organic and/or inorganic contamination is mostly co-located with the radiological contamination, since the sampling covered most of the fill area. However, there is an area to the south of the radiologically contaminated portion where additional sampling is needed to determine if organic and/or inorganic contamination extends into this area. The sampling will be done as pre-design activities.

b) Ground Water

U.S. EPA collected and sampled groundwater from four monitoring wells, screened in the St. Peter Sandstone. Well depths ranged from 32.5 to 33.2 feet bgs. In addition, U.S. EPA collected and sampled groundwater from four private wells in the area, one upgradient and three downgradient. U.S. EPA collected unfiltered samples from each of the wells and analyzed for radiological and chemical parameters. Results indicate the presence of radium-226 in each of the wells at concentrations ranging from 2.4 to 17.4 pCi/L. The highest was detected in the upgradient private residential well. U.S. EPA also analyzed groundwater samples for VOCs, SVOCs , and inorganics. Only one SVOC was detected above screening levels, bis(2-ethylhexyl)phthalate. This SVOC is a common laboratory contaminate and was not found in soils. Numerous metals were detected above screening levels, including beryllium, chromium, iron, lead, manganese, and nickel. Because of the presence of a shale bedrock confining layer at NPL-4, the upgradient concentration of radium, and the naturally occurring radium contamination in groundwater, U.S. EPA believes that the contamination in groundwater is not the result of site conditions.

c) Perched Water

U.S. EPA collected two unfiltered perched water samples and tested for radionuclides, VOCs, SVOCs, and inorganic chemicals. In addition, U.S. EPA also collected two filtered samples to determine the amount of contamination from suspended solids in the perched water. Radium concentrations in the two unfiltered samples exceeded the screening level. There was also little difference in radium concentrations between unfiltered and filtered samples, suggesting that the radium is dissolved. No VOCs or SVOCs were detected in the unfiltered samples. Several inorganics were detected above screening levels including; cadmium, iron, and manganese. Because the perched water sits directly in fill material, contamination in perched water may be attributable to migration from the fill. However, because the perched water appears to be an artifact of the landfilling process and is limited in volume and, since there is a deeper, more expansive ground water source, the perched water is not considered a viable potable water source. In addition, as part of the remedy for this site perched water will be removed.

5.1.3 NPL-8

Physical Features

1. Geology

Data from soil borings at NPL-8 indicate three distinct strata underlie the site: the uppermost layer consists of fill material; the second layer consists of unconsolidated glacial till; and the third layer is bedrock (St. Peter Sandstone).

2. Hydrogeology

The bedrock St. Peter sandstone acts as a groundwater aquifer in the area. The unconsolidated glacial tills appear to be semi-confining at various locations throughout the site, limiting direct communication between the fill layer and the St. Peter Sandstone. Depth to the St. Peter Sandstone is 32 feet bgs. U.S. EPA estimated the groundwater flow direction in the aquifer to be to the southwest towards the Fox River. The average linear velocity of groundwater in the St. Peter in this area was calculated to be approximately 16.4 ft/year.

U.S. EPA encountered perched water at the fill/native soil (glacial till) interface at approximately 15 ft bgs. The till acts as an aquitard for water percolating through the fill. There appears to be no direct communication between the perched aquifer and either the St. Peter or the Fox River, with the underlying tills and clays retarding downward migration. In addition, U.S. EPA noted no seeps along the bank of the Fox River. Indirect communication may exist as a result of seeps in an on-site drainage ditch which eventually links to the river.

Wells records from the Illinois State Geological Survey (ISGS) show a total of 231 groundwater wells registered within a 1-mile radius of the NPL-8 site. Most of the wells are screened in the St. Peter from 9 to 164 ft bgs; however, many of these wells may not be in use because the Ottawa City municipal wells supply drinking water to city residents. The City of Ottawa’s municipal wells are screened in the Galesville Sandstone which is below the St Peter, and are screened between 1,180 and 1,200 feet bgs.

3. Hydrology

The NPL-8 site is approximately 2.8 miles northeast (upstream) from the confluence of the Fox and Illinois Rivers. According to a Federal Emergency Management Agency (FEMA) Flood Insurance Survey study, the surface of NPL-8 is not situated in a flood plain. The study indicated that the flood stage elevations for 10, 50, 100, and 500 year floods were at elevations of 470.6 ft, 474.5 ft, 476 ft, and 480 ft, respectively. Even though NPL-8, which lies at an elevation of 485 ft, would not be affected, the flood water would probably back-up into an on-site drainage ditch via a nearby creek, which lies at an elevation of approximately 470 ft.

Natural surface drainage patterns have been altered by the construction of an on-site drainage ditch and landfilling activities. The drainage ditch discharges into a nearby creek (O'Neill Branch) which discharges into the Fox River. Even though the site has been altered, the ultimate destination of surface run-off is the river.

4. Ecology

Land habitats at the NPL-8 site include open fields and deciduous woods. Open field habitat is in the center of the property, with various grasses being present. Various deciduous trees are scattered throughout the site, with higher density along the river and in the ravines. Signs of deer, rabbit, raccoon, and squirrel have been observed on the site grounds. Other site inhabitants include various songbirds, small mammals, reptiles, and amphibians common to northwest Illinois. No signs of endangered species were noted.

The portion of the Fox River near the site is an Illinois Natural Area Inventory site. The National Wetlands Inventory classifies the Fox River as a lower perennial riverine system with an unconsolidated bottom that is permanently flooded. Sport fish in the Fox River include channel catfish, carp, muskellunge, and small mouth bass. A state-threatened fish, *Moxostoma carinatum* (river redhorse), was found to be a common inhabitant in this section of the Fox River during a 1991 survey.

5. Contamination

a) Soils

U.S. EPA advanced a total of 86 soil borings at NPL-8. We drilled five of these bonings at off-site background locations and ten were drilled at an adjacent property to determine the presence of off-site contamination. Borings were advanced to depths ranging from six to 28 feet bgs. Generally, one surface and two subsurface soil samples were retained for radiological analysis. Surface samples were collected from the six to 12 inch interval and subsurface samples were collected at varying intervals below this. U.S. EPA also conducted organics and metals analysis for subsurface samples at five borings. Figure 4 is a site map of NPL-8.

Radium-226 concentrations exceeded the screening level of 6.2 pCi/g in 24 of 71 surface soil samples, with a maximum concentration detected of 251 pCi/g. Radium-226 concentrations exceeded the screening level in 20 of the 138 subsurface samples, with the maximum concentration detected of 844 pCi/g, at a depth of nine to 11 ft bgs. The radium-226 screening level was exceeded at depths of up to 18 ft bgs. U.S. EPA estimates the volume of radium contaminated soil at NPL-8 to be 72,000 cy.

Concentrations of radium-226 in samples collected from background borings ranged from 0.78 to 1.21 pCi/g.

U.S. EPA advanced ten borings at an adjacent property, referred to as the Rowe property, but samples were only collected in borings where fill material was encountered. Concentrations of radium-226 ranged from 0.65 to 4.20 pCi/g and were below screening levels in the surface and subsurface samples. However, samples collected along the fence line of the NPL-8 and Rowe properties showed concentrations of radium-226 above the screening level that spilled over on to a small portion of the Rowe property. U.S. EPA estimates the volume of radium-226 contaminated soils along the fence line to be 1,000 cy.

U.S. EPA also analyzed subsurface samples collected from five borings and analyzed for VOCs, SVOCs, pesticides/PCBs, and inorganics. The only contaminants found above screening levels were SVOCs and inorganic chemicals. SVOCs included benzo(a)anthracene, benzo(a)flouranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, and dibenzo(a,h)anthracene. Inorganic contaminants found above screening levels included antimony, arsenic, beryllium, iron, lead, and manganese. Although, U.S. EPA collected a limited number of samples to assess organic and inorganic contamination at NPL-8, U.S. EPA believes that the organic and inorganic contamination is co-located with and limited to the area of radiological contamination since the sampling covered the entire fill area.

b) Surface Water and Sediment

Because of the proximity of NPL-8 to the Fox River, U.S. EPA collected surface water and sediment samples and analyzed for radium-226. We collected six surface water and 16 sediment samples. USEPA collected three surface water samples from a nearby creek and three were collected from the Fox River at upstream and downstream locations Sediment samples were collected from the creek, the Fox Rivet, and an on-site drainage ditch. In the surface water samples, U.S. EPA detected no concentrations above method detection limits for radium-226. In the sediment samples, U.S. EPA detected no concentrations above the screening level for radionuclides. The majority of the sediment samples were below background of 1.2 pCi/.g and only three samples from the nearby creek were above background, with the highest detection of 2.79 pCi/g.

c) Ground Water

U.S. EPA collected and sampled groundwater from three monitoring wells, screened in the St. Peter Sandstone. These wells were deep stratigraphic borings that were converted to monitoring wells. The deep wells ranged in depth from 40 to 48 feet bgs. In addition, U.S. EPA collected and sampled groundwater from four private wells in the area, located upgradient and sidegradient of the site. Since NPL-8 is located right next to the river and groundwater flow direction is towards the river, there are no residential wells located downgradient of the site. U.S. EPA collected unfiltered samples from each of the wells and analyzed for radiological and chemical parameters. Results indicate that radium-226 concentrations did not exceed the MCL in any of the on-site deep monitoring wells. However, radium-226 concentrations did exceed the MCL in three of the upgradient and sidegradient residential wells at a range of 8.8 to 15.6 pCi/L, suggesting that the radiological contamination in groundwater is naturally occurring. U.S. EPA also collected samples for chemical analysis from the three deep monitoring wells. The only chemicals detected above screening levels were inorganics. Inorganics detected included iron, lead, manganese, and nickel. Because of the presence of a semi-confining glacial till at NPL-8, the upgradient and sidegradient concentrations of radium-226, and the naturally occurring radium contamination in groundwater, U.S. EPA believes that the contamination in groundwater is not the result of site conditions.

d) Perched Water

U.S. EPA installed five shallow groundwater monitoring wells in the perched water zone. U.S. EPA collected samples from four of the wells. One of the wells was dry at the time of sampling and it was not sampled. Perched water samples were tested for radionuclides, VOCs, SVOCs, and inorganic chemicals. In addition, U.S. EPA also filtered samples to determine the amount of contamination from suspended solids in the perched water. Results of the unfiltered shallow monitoring well samples indicate radium-226 ranging from non-detectable levels to 65 pCi/L. Radium-226 concentrations in filtered samples were all below method detection limits. This suggests that the radium contamination is primarily in the suspended solids. No VOCs or SVOCs were detected in the unfiltered samples. A number of inorganics were detected in unfiltered samples above screening levels including; antimony, arsenic, beryllium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, thallium, vanadium, and zinc. Because the perched water sits directly in fill material, contamination in perched water may be attributable to migration from the fill. However, because the perched water appears to be an artifact of the landfilling process and is limited in volume and since there is a deeper, more expansive ground water source, U.S. EPA does not consider the perched water a viable potable water source.

5.1.4 NPL-9

<u>Physical Features</u>

1. Geology

Data from soil borings at NPL-9 indicate three distinct strata underlie the site: the uppermost layer consists of fill material; a layer of sand lies intermittently between the fill layer and the bottom layer; and the third layer consists of St. Peter Sandstone bedrock.

2. Hydrogeology

The bedrock St. Peter sandstone acts as a groundwater aquifer in the area. Unlike many of the other Ottawa Radiation Areas, U.S. EPA found no layer between the fill and bedrock that impeded or limited the flow of ground water. Average depth to groundwater at three installed groundwater monitoring wells is 10.7 feet bgs. U.S. EPA estimates the groundwater flow direction in the aquifer to be to the south to southeast. The average linear velocity of groundwater in the St. Peter in this area was calculated to be approximately 30.42 ft/year.

Well records from the Illinois State Geological Survey (ISGS) show a total of 37 groundwater wells registered within a 1-mile radius of the NPL-9 site. Twenty three are private, 11 are commercial/industrial, and three are either municipal or large commercial/industrial production wells. Most of the private wells are screened in the St. Peter from 90 to 477 ft bgs; however, many of these wells may not be in use because the Ottawa City municipal wells supply drinking water to city residents. The larger wells are screened within the Galesburg Sandstone at depths of 1,180 t 1,250 feet bgs.

3. Hydrology

The NPL-9 site is approximately 3/4 of a mile north of the Illinois River, southwest (downstream) of the confluence of the Illinois and Fox Rivers. NPL-9 is at an elevation of 485 feet, and is not within the flood plain of the Illinois River.

The natural surface drainage patterns have been altered by landfilling and construction activities. Overland flow is generally to the south, but a residential area to the west gets some run-off. Several storm sewers located along Chestnut and Marquette Streets are discharge points for surface run-off.

4. Ecology

Land habitats at the NPL-9 site include open fields and deciduous woods. Open field habitat is in the center of the property, with various grasses present. Deciduous trees are located along the site borders. Signs of rabbit, raccoon, and squirrel have been observed on the site grounds. Other site inhabitants include various songbirds, small mammals, reptiles, and amphibians common to northwest Illinois. No signs of endangered species were noted.

5. Contamination

Due to the configuration of the investigative area and the associated land use of the various properties at NPL-9, U.S. EPA divided the site into two smaller study areas (Areas A and B). These areas are shown in Figure 5.

a) Soils

During the period from 1995 through 1997, the U.S. EPA removal program excavated and disposed of contaminated soil at this site. This action resulted in the removal of a total of 5,766 tons, or approximately 4,300 cubic yards (cy) at NPL-9. However, U.S. EPA terminated excavation activities at approximately 6 to 8 feet bgs due to depletion of removal action funds and the site was backfilled with clean soil to grade. Based on radiation surveys conducted by the Illinois Department of Nuclear Safety (IDNS) prior to termination of removal actions, the IDNS and the U.S. EPA suspected that there were additional areas of radium-contaminated soil. U.S. EPA later decided to move the project into the Superfund remedial program to allow further characterization and continue clean-up efforts.

As part of the additional investigative efforts, U.S. EPA advanced 40 subsurface soil borings in Areas A and B at NPL-9. U.S. EPA retained one soil sample for radiological analysis at each boring location. We conducted organic analysis for samples at three borings and inorganic analysis for samples at ten borings.

Subsurface investigation in Area A consisted of 29 soil borings. U.S. EPA advanced borings to depths ranging from 6 to 14.45 feet bgs. Radiological analysis of soil samples collected from these borings indicate the presence of radium-226 at concentrations ranging from 0.88 to 10.1 picoCuries per gram (pCi/g). U.S. EPA estimates the volume of radium contaminated soil in Area A to be 300 cy.

Subsurface investigation in Area B consisted of nine soil borings. U.S. EPA advanced borings to a maximum depth of 7 feet bgs. Radiological analysis of samples collected from these borings indicate the presence of radium-226 at concentrations ranging from 0.87 to 175 pCi/g. U.S. EPA estimates the volume of radium contaminated soil in Area B to be 80 cy.

Additionally, three borings were advanced on properties neighboring NPL-9. These borings contained levels of radium at or slightly above the background level of 1.2 pCi/g.

Using the results of the soil borings and radiation surveys performed during the investigation, U.S. EPA estimated the area of contaminated soils potentially requiring excavation. The estimated areal extent of radium contamination for NPL-9 is shown on Figure 5.

U.S. EPA also analyzed samples collected from three borings in Areas A and B for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and pesticides/PCBs. U.S. EPA also collected and analyzed ten soil samples from Areas A and B for inorganic chemicals. Methylene chloride was the only VOC detected above screening levels. A number of SVOCs were detected above screening levels including, benzo(a)antrhacene, benzo(a)pyrene, benzo(b)flouranthene, carbazole, 2-methylnapthalene, and napthalene. Inorganic contaminants found above screening levels included arsenic, barium, beryllium, cadmium, chromium, iron, lead, nickel, selenium, thallium, and zinc. U.S. EPA limited sampling to assess organic and/or inorganic contamination at the NPL-9 site to the areas of radiological contamination. Additional sampling is needed to determine if organic and/or inorganic contamination extends beyond this area. The sampling will be done as pre-design activities.

b) Ground Water

U.S. EPA collected and sampled groundwater from three monitoring wells, screened in the St. Peter Sandstone. Well depths ranged from 26 to 27.5 ft bgs. U.S. EPA collected unfiltered samples from each of the wells and analyzed for radiological and chemical parameters. Total radium concentrations were below the screening level for all groundwater samples collected. U.S. EPA also analyzed groundwater samples for VOCs, SVOCs, and inorganics. No VOCS or SVOCs were detected above method detection limits of the laboratory. Numerous metals were detected above screening levels, including arsenic, iron, lead, and manganese. Even though groundwater is not being used, U.S. EPA believes that, because of the unconfined conditions of the aquifer in the area of NPL-9, additional investigation of inorganic contaminants in groundwater is warranted.

5.1.5 Illinois Power

Physical Features

1. Geology

Data from soil borings at Illinois Power (IP) indicate three distinct strata underlie the site: the uppermost layer consists of fill material; a layer of silts and sands; and a bottom layer consisting of St. Peter Sandstone bedrock.

2. Hydrogeology

The bedrock St. Peter sandstone acts as a groundwater aquifer in the area. The silt and sand layer acts as a confining to semi-confining layer.

There are a total of 11 groundwater wells within one mile of the IP site. Seven are residential and four are municipal. The seven residential wells are mostly outside of town and may or may not be in use, considering that the area around the IP site is within the city limits and is supplied with drinking water. The four municipal wells are screened in the Galesville Sandstone between 1,180 and 1,220 feet bgs.

3. Hydrology

The IP site is approximately 2,000 feet northwest of the confluence of the Illinois and Fox Rivers. The site is not within the flood plain of either river.

The site is covered with either mowed grassy areas, buildings, or paved lots. The topography is flat. Some run-off occurs in the grassy areas to the paved areas, where it is diverted to storm sewers.

4. Ecology

The IP site is in the central business district of Ottawa. Land habitat is mostly mowed lawn with a few mature trees. U.S. EPA has observed signs of songbirds and squirrels.

5. Contamination

U.S. EPA advanced a total of 14 soil borings around the perimeter of the IP building. Soil samples from each boring were analyzed for radium-226. Three soil samples were also analyzed for metals. No groundwater samples were collected. Figure 6 is a site map of the Illinois Power property.

U.S. EPA advanced eight soil borings on the west side of the IP building. Radium-226 concentrations ranged from 1.0 to 7.61 pCi/g. The highest concentration was found at a depth of two to three feet bgs.

U.S. EPA advanced three borings on the south side of the building. Radium-226 concentrations ranged from 1.0 to 6.8 pCi/g. The highest concentration was detected at a depth of one to two feet bgs.

We also advanced three other borings along the east and north sides of the building. Radium-226 concentrations in these samples were all below background of 1.2 pCi/g.

U.S. EPA estimates the volume of radium contaminated soil at the IP site to be 20 cy.

Using the results of the soil borings and radiation surveys performed during the investigation, U.S. EPA estimated the area of contaminated soils potentially requiring excavation. The estimated areal extent of radium contamination for the IP site is shown on Figure 5.

U.S. EPA also analyzed samples collected from three borings and analyzed inorganic chemicals. Inorganic contaminants found above screening levels included arsenic, chromium, copper, iron, magnesium, nickel, and zinc. Because radium-226 is considered the primary chemical of concern U.S. EPA only collected a limited number of samples to assess organic and/or inorganic contamination at the site. U.S. EPA limited sampling to assess organic and/or inorganic contamination at the Illinois Power site to the areas of radiological contamination. Additional sampling is needed to determine if organic and/or inorganic contamination extends beyond this area. The sampling will be done as pre-design activities.

6. Current and Potential Future Site and Resource Uses

This section of the ROD will describe the current and reasonably anticipated future land uses and current and potential beneficial ground-water uses. A brief discussion of the basis of future assumptions is also provided where it is appropriate.

6.1 Land Use

6.1.1 NPL-1

Residential and commercial areas surround NPL-1. However, currently Areas A, B, and C of NPL-1 are not being used for either purpose and are open lots. All three areas are privately owned and have the potential to be developed as residential or commercial properties. The City of Ottawa has proposed putting a walking path along the edge of the Fox River, but at this point, the project is in the early planning stages and many of the details are not known. U.S. EPA has asked the City to keep us informed of any future plans for the path.

6.1.2 NPL-4

Area A of NPL-4 was originally a residential property. A home built on the property had potentially dangerous levels of radon from the radium contamination on the property and the residents were requested to vacate the home. The homeowners refused to move and eventually the IDNS purchased the property from them. The building was demolished and currently it is still owned by the IDNS with the intent to return the property to residential or commercial use after the site is remediated. Area B currently has a commercial establishment on the property that the U.S. EPA believes is defunct. Other properties surrounding NPL-4 are a mixture of residential and commercial properties. Both areas have the potential to be developed in the future for residential or commercial development.

6.1.3 NPL-8

The State of Illinois is a current owner of the NPL-8 property. To date the site has not been developed as a State park. U.S. EPA requested that the State provide a letter regarding its future plans for the property, to facilitate our decision-making for the remediation based on potential use of the site. Appendix C contains a copy of the letter we received from the Illinois Department of Natural Resources (IDNR), who manages the property, specifically outlining the State's future plans for the property. Future plans include the use of the NPL-8 property as part of a canoe trail along the Fox River, along with ancillary structures, i.e. campgrounds, picnic facilities, showers, toilets, and eventually, depending on the amount of use, staff residences. The State's future plans played a pivotal role in the comparative analysis of the remedial alternatives for NPL-8, as described later in this ROD. In particular, U.S. EPA looked at remedial alternatives that allow for reasonable flexibility for structures on certain portions of the property and any excavation associated with their construction.

6.1.4 NPL-9

Area A of NPL-9 originally was a commercial property. The site contained two warehouses which the U.S. EPA tore down as part of the removal action to excavate contaminated soils under the buildings. Other commercial properties, a train track, and residential properties surround Area A. Area A has the potential to be developed as a residential commercial property in the future. Area B of NPL-9 is small contaminated spot just to the south of Area A. This spot is along the Illinois & Michigan Canal bike path which is owned by the State of Illinois. The radium contamination is a small volume located at the surface and will be excavated as part of the larger scale remedial activities at Area A.

6.1.5 Illinois Power

The Illinois Power site currently contains a commercial building. The radium contamination has been found along the perimeter of the building. The site will most likely remain commercial, but has the potential to be redeveloped as a residential site in the future.

6.2 Groundwater Use

6.2.1 NPL-1

Groundwater associated with NPL-1 is currently not being utilized. The site is within the Ottawa city limits. The area surrounding the site is predominantly residential and is hooked-up to municipal water. If residential properties are built on the site it is reasonable to predict that they would also utilize municipal water services.

6.2.2 NPL-4

Groundwater associated with NPL-4 is currently not being utilized. The site is outside the city limits and, at least at this stage, is not hooked-up to municipal water. The City of Ottawa has plans to extend water services along Canal Road, so it is conceivable that in the future municipal water supplies will be available. If site groundwater is used in the future it will most likely be the deep St. Peter Sandstone aquifer, which has been designated by State of Illinois as a Class I aquifer in the Ottawa area. The St. Peter appears to be unaffected by radium contamination from

NPL-4. Potential perched water at NPL-4 is not a potable water source because of the limited volume.

6.2.3 NPL-8

Groundwater associated with NPL-8 is currently not being utilized. The site is outside the city limits and, at least at this stage, does not have municipal services. Predicting future use of groundwater is difficult because of the planned recreational use. However, if site groundwater is utilized, it will most likely be from the deep St. Peter Sandstone which, has been designated by State of Illinois as a Class I aquifer in the Ottawa area. The St. Peter appears to be unaffected by radium contamination from NPL-8. Potential perched water at NPL-8 is not a potable water source because of the limited volume.

6.2.4 NPL-9

Groundwater associated with NPL-9 is currently not being utilized. The site is within the Ottawa city limits. The area surrounding the site is predominantly residential/commercial and is hooked-up to municipal water. If residential properties are built on the site it is reasonable to predict that they would also utilize municipal water services.

6.2.5 Illinois Power

Groundwater associated with the Illinois Power site is currently not being utilized. The site is within the Ottawa city limits. The area surrounding the site is predominantly residential/commercial and is hooked-up to municipal water. If residential properties are built or commercial properties remain on the site it is reasonable to predict that they would also utilize municipal water services.

7. <u>Summary of Site Risks</u>

U.S. EPA assessed human health and ecological risks to evaluate the impact to human health and the envirom-nent if no remedial actions are taken at the sites. Information and data collected during the investigations at each site served as the foundation for the risk evaluations. These risks evaluations provide the basis for action and identify the contaminants and exposure pathways that the remedial action must address.

7.1 Summary of Human Health Risk Assessments

Radiological contaminants were the primary chemicals of concern (COCs) at the Ottawa sites. The major potential impact resulting from exposure to radiological contaminants is cancer induction. Thus, adverse radiological health effects are limited to carcinogenic effects. This is consistent with U.S. EPA guidance, which notes that cancer risk is generally the limiting effect for radionuclides, and suggests that radiation carcinogenesis be used as the sole basis for assessing radiation human-health risks. This section of the ROD summarizes the radiation human-health risk assessments for each of the sites. U.S. EPA also considers a number of SVOCs and inorganics to be chemicals of potential concern (COPCs). There is sufficient data to indicate that certain chemicals may pose a risk based upon a comparison to soil screening levels. Additional sampling is needed at some of the sites to determine the extent of the chemical contamination and to assess the risk associated with chemical contamination.

Potential risks to human health for cancer are expressed numerically, i.e. 1E-04 or 1E-06. Carcinogenic risk expressed as 1E-04 means that one of 10,000 people exposed to contamination over a 70-year lifetime could potentially develop cancer as a result of the exposure. A carcinogenic risk of 1E-06 means that one of 1,000,000 people exposed over a 70-year lifetime could potentially develop cancer as a result of the exposure. U.S. EPA has established a carcinogenic risk range in an attempt to set standards for remediation and protectiveness. In general, as carcinogenic risks increase above one case in a million people exposed over a 70-year lifetime, they become less desirable. The carcinogenic risk to individuals generally should not exceed one case in 10,000 exposures.

The risk assessment uses a conservative estimate when evaluating a potential risk. This provides a high level of protection for public health and the environment. For example, some of the risk estimates assume that a site may be developed for future residential land use and that people use or will regularly use contaminated groundwater for drinking and bathing, even though these may not be the current circumstances. Therefore, you should regard the excess lifetime cancer risk estimates as conservative estimates of potential cancer risk rather than as actual representations of true cancer risk.

NPL-1

U.S. EPA focused risk evaluation at NPL-1 on potential future uses of the property. Because Areas A, B, and C of the site are privately owned and institutional controls would be difficult to implement, U.S. EPA evaluated risks to future residential users. Under this exposure scenario, U.S. EPA assumed unrestricted use of the property and the potential for residences to be developed. The primary risk to future residents is exposure to radium-226 in soils and indoor inhalation of radon gas in the enclosed space of the residence. In Area A, cancer risks for this exposure scenario were as high as 3E-03; in Area B risks were as high as 1E-02; and in Area C risks were as high as 2E-03. These risk estimates all exceed the U.S. EPA risk range of 1E-06 to 1E-04. Risks in Area C may be attributable to background levels.

NPL-4

U.S. EPA focused risk evaluation at NPL-4 on potential future uses of the property. Under this exposure scenario, U.S. EPA assumed unrestricted use of the property and the potential for residences to be developed. The primary risk to future residents is exposure to radium-226 in soils and radon gas in the enclosed space of the residence. In Area A, cancer risks for this expo sure scenario were as high 2E-01 and in Area B risks were as high as 6E-02. These risk estimates exceed the U.S. EPA risk range of 1E-06 to 1E-04.

NPL-8

U.S. EPA focused risk evaluation at NPL-8 on potential future uses of the property. Based on the State of Illinois specific future plans for the NPL-8 property, as described in Section 6.1.3, the risk evaluation became a hybrid of various exposure scenarios. Future plans include recreational use. However, many of the specific plans, i.e. construction of facilities and buildings, are at the high end of recreational use. In some cases, for instance indoor inhalation of radon gas in these facilities and buildings, U.S. EPA examined scenarios similar to risks to future residential users of the property, even though residential use is not a likely future scenario for the site. Under standard recreational assumptions, risks to recreational users were within U.S. EPA's acceptable risk range. Risks from inhalation of radon (indoor and outdoor combined) to staff who may be stationed at the site were as high as 1E-02, which exceeds the risk range.

NPL-9

U.S. EPA focused risk evaluation at NPL-9 on potential future uses of the property. Because Area A of the site is privately owned and institutional controls would be difficult to implement, U.S. EPA evaluated risks to future residential users. Under this exposure scenario, U.S. EPA assumed unrestricted use of Area A on the NPL-9 property and the potential for residences to be developed. The primary risk to future residents is exposure to radium-226 in soils and radon gas in the enclosed space of the residence. In Area A, total cancer risks across all exposure scenarios range were as high 5E-03. Area B is a state owned piece of property that is associated with a bike trail along the Illinois/Michigan Canal. U.S. EPA evaluated recreational use in Area B. The primary risk to future residents is exposure to radium-226 in soils and outdoor inhalation of radon gas. In Area B risks were as high as 2E-03. These risk estimates all exceed the U.S. EPA risk range of 1E-06 to 1E-04.

Illinois Power

Again, U.S. EPA examined potential future uses when evaluating risk for the IP site. U.S. EPA felt that while future residential use was possible at the site, a more reasonable scenario was for the site to remain a commercial/industrial property. Risks to future commercial/industrial users were primarily from inhalation of radon gas. These risks were as high as 4E-04. This risk estimate exceeds U.S. EPA's risk range.

7.1.1 Identification of Chemicals of Concern

Primarily, radium-226 and radon-222 were the contaminants evaluated in the risk assessment for each of the sites. Radon-222 is a byproduct of radium-226. Radon gas escapes from soils contaminated with radium-226 and can collect in enclosed structures. U.S. EPA also considers a number of SVOCs and inorganics to be chemicals of potential concern (COPCs). There is sufficient data to indicate that certain chemicals may pose a risk based upon a comparison to soil screening levels. Additional sampling is needed at some of the sites to determine the extent of the chemical contamination and to assess the risk associated with chemical contamination.

7.1.2 Exposure Assessment

The purpose of the exposure assessment is to estimate the magnitude of human exposure to radionuclides found in environmental media at the sites. The results of the exposure assessment are subsequently combined with radionuclide toxicity information to quantitatively estimate the human health risks associated with exposure to radionuclides.

The pathways used to evaluate the potential health risks associated with human exposure to radionuclides are similar to those used for evaluating chemical contaminants, except for external gamma and high-energy beta radiation, which is unique to radionuclides. Figure 7 provides a model for some of the receptor and community feeding relationships. High-energy beta and gamma radiation emitted from radionuclides in contaminated media can travel long distances with only minimum attenuation in these media before depositing their energy in human tissues. While beta ranges may be shorter than those of gamma sources, external beta sources can still pose a risk to organs such as the eyes and skin. Therefore, in addition to evaluating exposure due to ingestion, inhalation, and dermal contact, an external penetrating radiation exposure evaluation is important for radiation risk assessments.

The inhalation of radon-222 gas and its decay products can be a major dose contributor for internal radiation when radium-226 is present in soils, especially under residential and commercial/industrial conditions. Because radon and its byproducts could accumulate to high concentrations in buildings located on radium-contaminated sites, U.S. EPA assumed for future residential and commercial/industrial scenarios that a residence or business could be built right over radium-contaminated areas. Radium-226 present in groundwater that would be used by future residents or commercial/industrial workers for drinking, cooking, and showering could constitute another source for the radon inhalation exposure pathway.

Values for daily intake calculations for radium and radon at the sites are presented in Table 1. Exposure point concentrations for radium-226 in soils were calculated as the 95 percent upper confidence limit (95% UCL) on the arithmetic mean of log-transformed data. Radon concentrations were not measured at the sites. Therefore, estimates for radon exposure point concentrations in indoor air were made using RESRAD Computer Code Version 5.82, which was developed specifically for radiological assessments, including health risk assessments.

Depending on conditions at each site, U.S. EPA quantitatively evaluated the following exposure pathways in the risk assessment; current/future residential scenario (adult and young child), current/future recreational scenario (adult and young child), future commercial/industrial worker (adult), future construction worker (adult).

7.1.3 Toxicity Assessment

This toxicity assessment presents the appropriate toxicity values and the weight of evidence for the toxicity of radionuclides. Applicable human toxicity values are identified for the relevant exposure routes. U.S. EPA obtained toxicity values and criteria for radionuclides from the Integrated Risk Information System (IRIS) and the Health Effects Assessment Summary Tables (HEAST). Toxicity values include radionuclide cancer slope factors (CSFs) for evaluating carcinogenic risks. The CSFs for radionuclides used in this risk assessment are presented in Table 2.

U.S. EPA's Office of Radiation and Indoor Air calculates radionuclide CSFs values using health effects data and dose and risk models from a number of national and international scientific advisory commissions and organizations. U.S. EPA considers all radionuclides to be carcinogenic (weight of evidence class A), based on their property of emitting ionizing radiation and on the evidence provided by epidemiological studies of radiation-induced cancer in humans.

7.1.4 Risk Characterization

In the risk characterization, the results of the exposure assessment and the toxicity assessment are integrated to quantitatively evaluate the potential current and future risk to human health. U.S. EPA evaluated carcinogenic risks for radionuclides for each exposure route of concern and for all exposure routes combined. The risk characterization also identifies uncertainties associated with contaminants, exposure, or toxicity assumptions.

7.1.4.1 Quantitative Risk Evaluation for Radionuclides

The cancer risk from radionuclides was evaluated in accordance with U.S. EPA guidance provided in HEAST. In brief, risks are calculated separately for inhalation, ingestion, and external exposures, and then totaled, as follows:

$$R_{inh} = E_{inh} \text{ x } SF_{inh}$$
$$R_{ing} = E_{ing} \text{ x } SF_{ing}$$
$$R_{ext} = E_{ext} \text{ x } SF_{ext}$$
$$R_{tot} = R_{inh} + R_{ing} + R_{ext}$$

where:

R	=	Risk of cancer from inhalation (R_{inh}), ingestion (R_{ing}), external (R_{ext}), or total (R_{tot}) exposure.
E	=	Exposure to radionuclides from inhalation (E_{inh}), ingestion (E_{ing}), and external (E_{ext}) pathways.
SF	=	Cancer slope factor for inhalation (SF_{inh}), ingestion (SF_{ing}), and external exposure (SF_{ext}) pathways.

U.S. EPA uses the sum of risks across all radionuclides to estimate the lifetime risk from overall exposures.

7.1.4.2 NPL-1 Cancer Risks

Table 3 provides a summary of the radionuclide carcinogenic risk for NPL-1.

Residential Scenario

Under this exposure scenario, U.S. EPA assumed that residences are developed on the NPL-1 site and future residents (adult and children) could be exposed to radionuclides in on-site soil through incidental ingestion, external radiation, and inhalation of dusts and radon (indoor and outdoor). In addition, future residents were assumed to use on-site groundwater as a potable water supply, even though current residents in the area are hooked-up to the municipal water supply. In Area A, total cancer risks across all exposure scenarios range were as high as 3E-03; in Area B total risks were as high as 1E-02; and in Area C total risks were as high as 2E-03. These risk estimates all exceed the U.S. EPA risk range of 1E-06 to 1E-04, primarily due to the risk associated with the indoor inhalation of radon. It is important to note that most of the radon risk for Area C may be attributable to background levels of radium-226.

Commercial/Industrial Worker Scenario

Under this exposure scenario, U.S. EPA assumed that businesses are developed on the NPL-1 site. Future commercial/industrial workers (adults) were assumed to be exposed to radionuclides in on-site soil through incidental ingestion, external radiation, and inhalation of dusts and radon (indoor and outdoor). The total estimated radiological cancer risks were as high as 8E-04 in Area A, 3E-03 in Area B, and 5E-04 in Area C. These risk estimates all exceed U.S. EPA's risk range, primarily due to the risk associated with the indoor inhalation of radon. Again, most of the risk in Area C may be attributable to background levels of radium-226.

7.1.4.3 NPL-4 Cancer Risks

Table 4 provides a summary of radionuclide carcinogenic risk for NPL-4.

Residential Scenario

Under this exposure scenario, U.S. EPA assumed that residences are developed on the NPL-4 property. Future residents (adult and children) could be exposed to radium-226 in on-site soil through incidental ingestion, external radiation, and inhalation of dusts and radon (indoor and outdoor). U.S. EPA also assumed that future residents would use on-site ground water as a potable water supply. Total estimated cancer risk levels were as high as 2E-01 in Area A and 6E-02 in Area B. These risks exceed U.S. EPA's acceptable risk range, primarily due to risks from indoor inhalation of radon and its progeny.

Commercial/Industrial Worker Scenario

Under this exposure scenario, U.S. EPA assuined that businesses are developed on the NPL-4 site. Future commercial/industrial workers (adults) were assumed to be exposed to radionuclides in on-site soil through incidental ingestion, external radiation, and inhalation of dusts and radon (indoor and outdoor). The total estimated radiological cancer risks were as high as 4E-02 in Area A and 1E-02 in Area B. These risk estimates all exceed U.S. EPA's risk range, primarily due to the risk associated with the indoor inhalation of radon.

7.1.4.4 NPL-8 Cancer Risks

The State of Illinois has indicated future high-end recreational use for the NPL-8 site. However, because of specific future plans for the property (See Appendix C) outlined by the State, U.S. EPA evaluated risk for various scenarios, even though they are unlikely scenarios for future use. Table 5 provides a summary of radionuclide carcinogenic risk for NPL-8.

Residential Scenario

Under this exposure scenario, U.S. EPA assumed that facilities or buildings to house staff to manage the park are developed on the NPL-8 property. Future staff personnel could be exposed to radium-226 in on-site soil and sediments through incidental ingestion, external radiation, and inhalation of dusts and radon (indoor and outdoor) similar to future residents. Future staff personnel were also assumed to use on-site ground water as a potable water supply. Total estimated Cancer risk levels were as high as 1E-02. These risks exceed U.S. EPA's acceptable risk range, primarily due to risks from indoor inhalation of radon and its progeny.

Commercial/Industrial Worker Scenario

Under this exposure scenario, U.S. EPA assumed that facilities or buildings to house staff to manage the park are developed on the NPL-8 site. However, in this case exposure to staff residence were more similar to future commercial/industrial workers than future residents. Future staff personnel were assumed to be exposed to radionuclides in on-site soil through incidental ingestion, external radiation, and inhalation of dusts and radon (indoor and outdoor). The total estimated radiological cancer risks were as high as 9E-03. These risk estimates all exceed U.S. EPA's risk range, primarily due to the risk associated with the indoor inhalation of radon.

7.1.4.5 NPL-9 Cancer Risks

Table 6 provides a summary of radionuclide carcinogenic risk for NPL-9.

Residential Scenario

Under this exposure scenario, U.S. EPA assumed that residences are developed on Area A on the NPL-9 property. Future residents (adult and children) could be exposed to radium-226 in on-site soil through incidental ingestion, external radiation, and inhalation of dusts and radon (indoor and outdoor). Future residents were also assumed to use on-site ground water as a potable water supply. Total estimated cancer risk levels were as high as 5E-03. This risk exceeds U.S. EPA's acceptable risk range, primarily due to indoor inhalation of radon and its progeny.

Commercial/Industrial Worker Scenario

Under this exposure scenario, U.S. EPA assumed that businesses are developed on Area A on the NPL-9 site. Future commercial/industrial workers (adults) were assumed to be exposed to radionuclides in on-site soil through incidental ingestion, external radiation, and inhalation of dusts and radon (indoor and outdoor). The total estimated radiological cancer risks were as high as 9E-04. This risk estimate exceeds U.S. EPA's risk range, primarily due to the risk associated with the indoor inhalation of radon.

Recreational Use

Under this exposure scenario, U.S. EPA assumed that Area B on the NPL-9 property is used for recreational purposes. Current/future recreational users (adults and young children) were assumed to be exposed to radium-226 in on-site soil through incidental ingestion, external radiation, and inhalation of dusts and radon (outdoor only). Total estimated radiological cancer risks were as high as 2E-03. This estimate exceeds U.S. EPA's risk range, primarily due to external exposure to radium-226 in soils and outdoor radon inhalation.

7.1.4.6 Illinois Power Cancer Risks

Table 7 provides a summary of the radionuclide carcinogenic risk for the Illinois Power site.

Commercial/Industrial Worker Scenario

Under this exposure scenario, U.S. EPA assumed that the IP site continues to be used for commercial/industrial purposes. Future commercial/industrial workers (adults) were assumed to be exposed to radionuclides in on-site soil through incidental ingestion, external radiation, and inhalation of dusts and radon (indoor and outdoor). The total estimated radiological cancer risks were as high as 5.1E-04. This risk estimate exceeds U.S. EPA's risk range, primarily due to external exposure to radium-226 and the inhalation of radon.

7.1.4.7 Uncertainties

There are three primary areas in the risk assessment with significant levels of uncertainty which could result in an over- or under-estimation of risks to human health. These three areas of uncertainty are: (1) the reliability of environmental data used to develop the risk assessment to express conditions at the site; (2) the use of standard exposure assumptions which may or may not accurately reflect site conditions; and (3) methodology by which carcinogenic health criteria are developed to be used in toxicological assumptions. Most of the uncertainties are accounted for by making assumptions that tended to over-estimate risk.

7.2 Summary of Ecological Risk Assessments

U.S. EPA conducted a screening ecological risk assessment at the Ottawa Radiation Areas Superfund sites to evaluate the potential impacts of radionuclide COCs on ecological receptors inhabiting the site and in adjacent areas.

7.2.1 Identification of Chemicals of Concern

Radium-226 was the primary contaminant evaluated in the ecological risk assessment for each of the sites. Radon-222, which is a byproduct of radium-226 and was a primary risk driver in the human health risk assessment, was not a COC for the ecological assessment. U.S. EPA also considered a number of SVOCs and inorganics to be chemicals of potential concern (COPCs). There is sufficient data to indicate that certain chemicals may pose a risk based upon a comparison to soil screening levels. Additional sampling is needed at some of the sites to determine the extent of the chemical contamination and to assess the risk associated with chemical contamination.

7.2.2 Exposure Assessment

The Ottawa Radiation sites are characterized by old field habitat, including grassy vacant lots with some small and large stands of trees. Most of the sites are open fields with short to long grass; however, NPL-8 shows the most variability because of its size, with trees covering large areas of the site. NPL-1 and NPL-8 are adjacent to the Fox River. Deer have been seen on some of the properties and other animals potentially using the sites include songbirds, small mammals, reptiles, and amphibians common to northwest Illinois. A state-threatened fish, *Moxostoma carinatum* (river redhorse), was found to inhabit portions of the Fox River near the sites in a 1991 survey, however, the fish was not observed during investigative activities and the sites are not significantly impacting the river. Weather is characterized by significant seasonal variability.

The primary source of contamination is surface soil, subsurface soil, and buried debris contaminated with radium-226. Radium-226 produces ionizing radiation which, depending on the amount of radiation, can produce health effects including, cancer, inherited birth defects, and non-inherited birth defects in a variety of environmental receptors. Exposure point concentrations for radium-226 in soils were calculated as the 95 percent upper confidence limit (95% UCL) on the arithmetic mean of log-transformed data.

U.S. EPA examined three main exposure scenarios at all the sites:

- A primary consumer (herbivore) hazard quotient evaluation for mammalian species (i.e. deer mouse), where cumulative internal (i.e. consumption of vegetation, incidental ingestion of soil) and external exposure are compared with published or derived toxicity reference values.

- A secondary consumer (carnivore/insectivore) hazard quotient evaluation for an avian and mammalian species (i.e. American Robin and short-tailed shrew), where cumulative internal (i.e. consumption of insects/earthworm, incidental ingestion of soil) and external exposure are compared with published or derived toxicity reference values.

- A phytotoxicity hazard quotient evaluation where measured soil concentration are compared to plant toxicity obtained from the literature.

In addition, for NPL-1 and NPL-8 a benthic community hazard quotient evaluation where aquatic invertebrates cumulative internal and external radionuclide exposure is compared with published or derived toxicity values. A model showing some of the receptor and feeding community relationships is provided in Figure 7.

7.2.3 Ecological Risk Characterization

For all the sites there is no potential for adverse effects to the deer mouse, American robin, shrew, terrestrial plant, and aquatic invertebrate environmental receptors from exposure to radionuclides. However, based on the limited amount of data collected to assess chemical contamination some adverse effects are possible. As mentioned previously, to accurately assess the extent and impact of chemical contamination at all the sites, additional data needs to be collected.

7.2.4 Uncertainties

U.S. EPA defines a screening ecological risk assessment as "a preliminary risk assessment that can be conducted with limited site-specific data by defining assumptions for parameters that lack site-specific data." To ensure that sites which may pose an ecological risk are properly identified, the U.S. EPA suggests that "values should be consistently biased in the direction of overestimating risk." The primary sources of uncertainty include; environmental chemistry and sampling analysis, fate and transport parameters, exposure assumptions, and toxicological data.

7.3 Basis for Response Action

Actual or threatened release of hazardous substances from these sites, if not addressed by implementing the response actions selected in this ROD, may present a current or potential future threat to public health, welfare, or the environment.

8.0 Remediation Objectives

Remedial action objectives provide a general description of what the clean-up will accomplish. For the Ottawa Radiation Areas the objective is:

- Prevent ingestion and inhalation of, and external exposure to surface and subsurface soil contaminated with radium-226 exceeding the clean-up level

U.S. EPA developed the objective to achieve site clean-up to allow for the reasonably anticipated future land use at each of the sites.

8.1 Soil Clean-up Level for Radium-226

U.S. EPA established the clean-up level for radium-226 in soils based in part on *40 Code of Federal Regulations (CFR) Part 192, Standards for the Stabilization, Disposal, and Control of Uranium and Thorium Mill Tailings.* Detailed analysis of the applicable or relevant and appropriate requirements (ARARs) for the Superfund Remedial Actions at Ottawa indicated that 40 C.F.R. Part 192 was not applicable because the radioactive material at Ottawa is not residual material from inactive uranium processing sites. However, because of the potential relevance and appropriateness of the standard as a basis for developing clean-up levels for radium-226 in soils U.S. EPA will use it as a basis for determining the clean-up level at the Ottawa Radiation Areas.

U.S. EPA developed the standards established in 40 C.F.R. Part 192 specifically for the clean-up of uranium mill tailings at 24 sites, not including the Ottawa sites. Subpart B of 40 C.F.R. 192 contains soils standards for surface and subsurface soils. The purpose of the standards was to limit the risk from inhalation of radon decay products in houses built on land contaminated with radium-226 and other radioactive chemicals from tailings, and to limit gamma radiation exposure of people using contaminated land.

The surface soil standard of 5 pCi/g of radium -226 above background is a health-based standard. The relevant source of health risk for surface soil is exposure to gamma radiation, which is the basis for the standard.

The subsurface soil standard of 15 pCi/g of radium-226 above background is not a health-based standard, but rather was developed for use in limited circumstances to allow use of field measurements rather than laboratory analyses to determine when buried tailings had been detected. Specifically, the criterion for subsurface soils was derived for use in locating and remediating discrete deposits of high activity tailings (300-1,000 pCi/g) in subsurface locations at the original 24 sites. The subsurface criterion in Subpart B was originally proposed as 5 pCi/g above background. This criterion in the final rule was changed, not because of a reassessment of the level of contamination that would present a threat to health, but rather to help reduce the cost of locating buried tailings at the original 24 sites. At these sites there was expected to be little subsurface contamination ranging from 5 to 30 pCi/g. The subsurface criterion was not developed for situations where significant quantities of contamination exist between 5 and 30 pCi/g.

The clean-up standard is established as the removal of soils exhibiting levels of radium-226 at 5 pCi/g above background. The background level of radium-226 in the Ottawa area was determined to be 1.2 pCi/g. Therefore, the clean-up level for radium-226 in soils is 6.2 pCi/g. Please see the February 12, 1998, OSWER Directive 9200.4-25, "Use of Soil Clean-up Criteria in 40 CFR 192 as Remediation Goals for CERCLA sites" for more details.

This clean-up level will be extended to depth at the NPL-1, 4, 9 and Illinois Power sites because at these sites the residual contamination at depth can potentially pose a threat based on the future land use assumptions for these properties. However, for NPL-8, supplemental standards of 40 C.F.R. Part 192, Subpart C will be established for residual contaminated soils left below 10 feet below ground surface (bgs). U.S. EPA believes that the contaminated material below 10 feet bgs does not pose a clear present or future hazard and improvements could be achieved only at unreasonably high cost.

9.0 Description of Remedial Alternatives

The section will provide a brief explanation of the remedial alternatives considered for the Ottawa radiation sites.

9.1 Description of Remedy Components

Because of the reasonably anticipated future residential land use of the properties at NPL-1, 4, 9, and Illinois Power, remedy components for these sites were limited to complete excavation of soils above the clean-up level; backfilling excavated areas with clean material; and disposal of the excavated material at a licensed radioactive material landfill. In addition to these components, U.S. EPA anticipates the use of technologies or methodologies to reduce the volume of radioactive soils shipped off-site by separating out soils contaminated above the cleanup level as efficiently as possible.

Future use at the NPL-8 site is anticipated by the State of Illinois to be high-end recreational use as discussed in Section 6.1.3. This future scenario allowed the U.S. EPA to initially examine a number of remedy components for NPL-8, including capping technologies and excavation to varying depths. Capping technologies included institutional controls to restrict use of the property; soil consolidation; and the placement of an multi-layer engineered cap or a low-permeability soil/clay cover. Similar to the remedies examined for NPL-1, 4, 9, and Illinois Power, excavation includes contaminated soil removal; volume reduction; backfilling with clean material; and off-site disposal at a licensed radioactive landfill. However, in the case of NPL-8, U.S. EPA looked at removal to 5 feet and 10 feet bgs as well as complete excavation.

Organic and/or inorganic chemical contaminants have been found at all the sites. Additional sampling will be conducted at NPL-1, 4, 9, and the Illinois Power site as pre-design activities to determine the extent of chemical contamination. If organic and/or inorganic chemical contamination requires further remediation beyond the area of defined radiological contamination, U.S. EPA will modify this Record of Decision (ROD) through either an Explanation of Significant Differences or ROD Amendment as appropriate.

Since U.S. EPA found that groundwater was not significantly impacted at any of the sites, there are no specific remedial components for groundwater contamination. However, contaminated perched water was discovered at some of the sites and as part of excavation activities perched water may be encountered, particularly for the complete excavations alternatives proposed for NPL-4 and NPL-8. Remedial components for perched water include filtering to remove particulates, which based on water quality data contain most of the contamination, and discharge to the local municipal water system or the Fox River via a National Pollution Discharge Elimination System (NPDES) permitted outfall. Filter cake material will be dealt with similar to contaminated soils.

9.2 Common Elements and Distinguishing Features of the Remedial Alternatives

40 C.F.R. Part 192 became a key federal regulation and a common element of the remedial alternatives because of its use as a basis for the soil clean-up level. Even though a detailed analysis of the applicable or relevant and appropriate requirements (ARARs) for these sites indicated that is not applicable, the standard is potentially relevant and appropriate because it defines clean-up standards for soils contaminated with radium-226.

A distinguishing feature of the remedial alternatives for NPL-8 was using the supplemental standards of 40 C.F.R. Part 192 as a basis for leaving contamination above the clean-up level below ten feet bgs. NPL-8 meets the criteria for supplemental standards established in Subpart C of 40 C.F.R. Part 192. Based on future land use for NPL-8, the U.S. EPA believes that the residual radioactive material below ten feet bgs does not pose a clear present or future hazard and improvements could be achieved only at unreasonably high cost.

In addition, U.S. EPA considered state and federal ARARs associated with Resource Conservation and Recovery Act (RCRA) regulations for off-site transportation and disposal and state regulations for capping landfills. With the potential for off-site disposal of soils contaminated with organic and/or inorganic chemicals, U.S. EPA also considered applicable federal and/or state regulations for off-site transportation and disposal of these materials.

9.3 Expected Outcomes of the Remedial Alternatives

Future land use played a critical role in the development and selection of remedial alternatives for each of the sites. The capacity of a remedy to allow for residential use, in the case of NPL-1, 4, and 9, in a relatively short timeframe once clean-up levels are achieved and the remedy complete, played a decisive role in remedy selection. In the case of NPL-8, the capacity of the remedy to allow for high-end recreational use played the decisive role in remedy selection. A number of the remedies, including the capping options and the 5 feet bgs excavation, place restrictions on the property that the U.S. EPA believes will impede high-end recreational use.

10.0 Summary of Comparative Analysis of Alternatives

This section of the ROD provides an evaluation of the relative performance of the alternatives for each site to U.S. EPA's nine evaluation criteria so that the advantages and disadvantages of the alternatives are clearly understood.

10.1 Nine Criteria

U.S. EPA uses the nine criteria described below to evaluate the alternatives for each of the sites.

Threshold Criteria: The selected remedy must meet the following threshold criteria.

1. **Overall protection of human health and the environment** U.S. EPA uses this criterion to evaluate whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** U.S. EPA uses this criterion to evaluate whether the alternative meets federal and state

environmental statutes, regulation, and other requirements that pertain to the site or whether a waiver is justified.

Primary Balancing Criteria: U.S. EPA uses the balancing criteria to compare the effectiveness of the remedies.

3. **Long-term effectiveness and permanence** U.S. EPA uses this criterion to determine whether an alternative permanently maintains protection of human health and the environment, and the effectiveness of such protection.

4. **Reduction of contaminant toxicity, mobility, or volume through treatment** U.S. EPA uses this criterion to evaluate whether a particular treatment reduces the harmful effects of principle contaminants; their ability to move in the environment; and the amount of contamination present.

5. **Short-term effectiveness** U.S. EPA uses this criterion to determine the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

6. **Implementability** U.S. EPA use this criterion to consider the technical and administrative feasibility of implementing the alternative, such as relative availability of goods and services.

7. **Cost** U.S. EPA uses this criterion to estimate capital and operation and maintenance costs, as well as present worth costs. Present worth cost is the total cost of an alternative over time in terms of today's dollars.

Modifying Criteria: U.S. EPA uses these criteria to evaluate support agency and community response to the alternatives.

8. **State Acceptance** U.S. EPA uses this criterion to consider whether the state agrees with U.S. EPA's analyses and recommendations of the RI/FS and the proposed plan.

9. **Community Acceptance** U.S. EPA uses this criterion to evaluate public comments. The Record of Decision (ROD) will include a responsiveness summary that presents public comments and U.S. EPA responses to those comments. U.S. EPA will evaluate acceptance of the recommended alternative after the public comment period.

10.2 Comparative Analysis for NPL-1

Because U.S. EPA determined that residential land use would be a reasonable assumption for future use of NPL-1, U.S. EPA considered alternatives that would be appropriate for residential use. Table 8 provides a summary of the comparative analysis for NPL-1.

U.S. EPA evaluated two alternatives for NPL-1:

- Alternative 1 - No Action - U.S. EPA includes the no action alternative to provide a baseline comparison with the other alternative(s). The no action alternative implies that nobody will take any remedial action at the site. Therefore, the potential human health and environmental risks associated with exposure to the radium-226 contamination would be unchanged and could potentially increase if land use changed in the future.

- Alternative 2 - Excavation, Backfill, and Off-Site Disposal of Soil Contaminated with Radium-226 and, if necessary, Soils Contaminated with Organic and/or inorganic Chemicals - Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals and may need to be disposed of at an off-site landfill. Off-site disposal of soils with organic and/or inorganic contamination would occur in accordance with applicable federal and state regulations. Additional sampling will be conducted as pre-design activities at NPL-1 to determine the extent of chemical contamination and assess the need to further remediate soils contaminated with organic and/or inorganic chemicals.

Overall protection of human health and the environment

Alternative 2 is more protective than the no action alternative. It removes the uncertainty of future exposure risks, eliminates long-term management, and allows unrestricted residential use of the property. There are some short-term health risks associated with excavation, transportation, and disposal of radium contaminated soils; however, these risks can be managed with appropriate health and safety measures, engineering controls, and transportation procedures.

Compliance with ARARs

Alternative 2 complies with ARARs by reducing risks associated with exposure to radium-226. Alternative 1 does not comply with ARARs.

Long-term Effectiveness and Permanence

Alternative 2 offers the most long-term effectiveness and permanence because soils contaminated with radium-226 will be removed from the site. No long-term management would be required, and the uncertainty of future exposure risks is removed. Alternative 1 does not offer long-term effectiveness and permanence because no remedial action is implemented.

Reduction of Toxicity, Mobilily, and Volume Through Treatment

Alternatives 1 and 2 do not include treatment as an option. Therefore, neither Alternative 1 nor Alternative 2 meet this criteria.

Short-term Effectiveness

Alternative 1 actually provides better short-term effectiveness because with no action taking place, risks to workers or the environment during implementation does not exist. However, risks associated with the implementation of Alternative 2, potential fugitive dust and gas emissions, can be mitigated with appropriate health and safety measures, engineering controls, and transportation procedures.

Implementability

Alternative 1 is easier to implement as no action is required. However, even though Alternative 2 would be more difficult to implement, since it involves excavation, transportation and disposal of radioactive materials, it is technically and administratively feasible. In addition, services and materials to perform the action are available.

State Acceptance

The State of Illinois does not concur with the remedy selected for NPL-1 as described in Section 12.0 Selected Remedies of this ROD. However, see Section 14.0 Documentation of Significant Changes, for a fuller discussion of the State's position.

Community Acceptance

The community has indicated that it supports Alternative 2.

Cost

Alternative 1 has no cost, since there is no action. Alternative 2 has a total present worth cost of $1,083,000 and has no associated operation and maintenance (O&M) costs.

10.3 Comparative Analysis for NPL-4

Because U.S. EPA determined that residential land use would be a reasonable assumption for future use of NPL-4, U.S. EPA considered a range of alternatives that would be appropriate for residential use. Table 9 provides a summary of the comparative analysis for NPL-4.

U.S. EPA evaluated three alternatives for NPL-4

- Alternative 1 - No Action

- Alternative 2 - Excavation, Backfill, Off-Site Disposal of Soil Contaminated with Radium-226, and, if necessary, Soils Contaminated with Organic and/or Inorganic Chemicals, and Perched Water Collection - Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals and may need to be disposed of at an off-site landfill. Off-site disposal of soils with organic and/or inorganic contamination would occur in accordance with applicable federal and state regulations. Additional sampling will be conducted as pre-design activities at NPL-4 to determine the extent of chemical contamination and assess the need to further remediate soils contaminated with organic and/or inorganic chemicals.

- Alternative 3 - Excavation, Backfill, Volume Reduction Using Segmented Gate System, Off-Site Disposal of Soil Contaminated with Radium-226, and, if necessm, Soils Contaminated with Organic and/or inorganic Chemicals, and Perched Water Collection - Some soils excavated at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals and may need to be disposed of at an off-site landfill. Off-site disposal of soils with organic and/or inorganic contamination would occur in accordance with applicable federal and state regulations. Additional sampling will be conducted as pre-design activities at NPL-4 to determine the extent of chemical contamination and assess the need to further remediate soils contaminated with organic and/or inorganic chemicals.

Overall protection of human health and the environment

Alternatives 2 and 3 are more protective than the no action alternative. They remove the uncertainty of future exposure risks, eliminate long-term management, and allow unrestricted residential use of the property. There are some short-term health risks associated with excavation, handling, transportation, and disposal of radium contaminated soils and water; however, these risks can be managed with appropriate health and safety measures, engineering controls, and transportation procedures.

Compliance with ARARs

Alternatives 2 and 3 comply with ARARs by reducing risks associated with exposure to radium-226. Alternative 1 does not comply with ARARs.

Long-term Effectiveness and Permanence

Alternatives 2 and 3 offer the most long-term effectiveness and permanence because soils contaminated with radium-226 will be removed from the site. No long-term management would be required and the uncertainty of future exposure risks is removed. Alternative 1 does not offer long-term effectiveness and permanence because no remedial action is implemented.

Reduction of Toxicity, Mobility, and Volume Through Treatment

Alternatives 1, 2, and 3 do not include treatment as an option. Therefore, none of the alternatives meet this criteria.

Short-term Effectiveness

Alternative 1 actually provides better short-term effectiveness because with no action taking place, risks to workers or the environment during implementation does not exist. However, risks associated with the implementation of Alternatives 2 and 3, potential fugitive dust and gas emissions, can be mitigated with appropriate health and safety measures, engineering controls, and transportation procedures.

Implementability

Alternative 1 is easier to implement as no action is required. However, even though Alternatives 2 and 3 would be more difficult to implement, since they involve excavation, handling, transportation and disposal of radioactive materials, they are technically and administratively feasible. In addition, services and materials to perform the actions are available.

State Acceptance

The State of Illinois does not concur with the remedy selected for NPL-4 as described in Section 12.0 Selected Remedies of this ROD. However, see Section 14.0 Documentation of Significant Changes, for a fuller discussion of the State’s position.

Community Acceptance

The community has indicated that it supports Alternatives 2 and 3.

Cost

Alternative 1 has no cost, since there is no action. Alternative 2 has a total present worth cost of $8,050,000 and has no associated O&M costs. Alternative 3 has the highest cost at $9,700,000 and also has no associated O&M costs.

10.4 Comparative Analysis for NPL-8

Because the current and projected future land use at the NPL-8 site is high-end recreational, U.S. EPA considered a range of alternatives that may fit with recreational land use. Table 10 provides a summary of the comparative analysis for NPL-8.

U.S. EPA evaluated six alternatives for NPL-8:

- Alternative 1 - No Action

- Alternative 2 - Institutional Controls, Soil Excavation and Consolidation, and Installation of an Engineered Cap - The engineered cap would be a multilayer design consisting of (from top to bottom) a top vegetative layer, a biotic barrier, a soil drainage layer, and a two-component low-permeability layer.

- Alternative 3 - Institutional Controls, Soil Excavation and Consolidation, and Installation of a Low-Permeability Soil Cover - The low permeability soil cover would be a multilayer design consisting of (from top to bottom) topsoil layer, a 30-inch fill layer, a geosynthetic composite drainage system layer, and a 24-inch thick compacted clay layer.

- Alternative 4 - Soil Excavation, Volume Reduction, and Off-Site Disposal, Perched Water Collection - Soils excavated during implementation of this remedy containing 6.2 pCi/g of radium-226 or less may contain elevated levels of organic and/or inorganic chemicals and may need to be disposed at an off-site landfill. Off-site disposal would occur in accordance with applicable federal and state regulations.

- Alternative 5 - Institutional Controls, Excavation of Contaminated Soil to a Depth of 5 Feet Below Ground Surface (bgs), Volume Reduction, and Off-Site Disposal - Land use after implementation will be restricted to recreational use and structures will be allowed with appropriate controls for radon gas. Soils excavated during implementation of this remedy containing 6.2 pCi/g of radium-226 or less may contain elevated levels of organic and/or inorganic chemicals and may need to be disposed at an off-site landfill. Off-site disposal would occur in accordance with applicable federal and state regulations.

- Alternative 6 - Institutional Controls, Excavation of Contaminated Soil to a Depth of 10 Feet Below Ground Surface (bgs), Volume Reduction, Off-Site Disposal - Land use after implementation will be restricted to recreational use and structures will be allowed with appropriate controls for radon gas. Soils excavated during implementation of this remedy containing 6.2 pCi/g of radium-226 or less may contain elevated levels of organic and/or inorganic chemicals and may need to be disposed at an off-site landfill. Off-site disposal would occur in accordance with applicable federal and state regulations.

Overall protection of human health and the environment

U.S. EPA believes Alternatives 2, 3, 4, 5, and 6 are fully protective. Alternative 4, complete excavation of the radium-contaminated soils, removes the uncertainty of future exposure risks, eliminates long-term management, and allows unrestricted residential use of the property. Alternative 6, the excavation of contaminated soil to a depth of 10 ft bgs, removes the majority of the radioactive material. This alternative would provide the State with virtually unrestricted recreational use. The clean backfill would help prevent downward migration and provide protection against radiation exposure. However, because some waste will be left in place, there will be some restrictions on building for portions of the property and some downward migration may still occur. Alternative 5, the 5 foot excavation, is similar to Alternative 6 but because more waste will be left in place there will be greater restrictions on the property. Alternatives 2 and 3 provide a somewhat lesser degree of protection than the excavation options. Between the capping alternatives, protection is roughly similar with the engineered cap of Alternative 2 providing a slightly better degree of protection because a biotic layer in Alternative 2 helps prevent burrowing and has more erosion protection. In addition, Alternatives 2 and 3 would severely restrict the use of the property. There are some short-term health risks associated with excavation, handling, transportation, and disposal of radium contaminated soils and water, particularly for the excavation alternatives; however, these risks can be managed with appropriate health and safety measures, engineering controls, and transportation procedures. Alternative 1 provides the least amount of protection.

Compliance with ARARs

Alternative 2, 3, 4, 5, and 6 comply with ARARs by reducing risks associated with exposure to radium-226. Alternative 1 does not comply with ARARs.

Long-term Effectiveness and Permanence

Alternative 4 offers the most long-term effectiveness and permanence because soils contaminated with radium-226 will be removed from the site. No long-term management would be required and the uncertainty of future exposure risks is removed. Alternatives 2, 3, 5, and 6 leave some waste in place so some long-term management would be necessary and some uncertainty would remain about future exposure risks. Alternatives 5 and 6 would provide greater long-term benefits than 2 and 3, mainly because of fewer maintenance requirements and fewer restrictions on the future use of the property. Alternative 6 has fewer restrictions on future use than Alternative 5. Proper engineering controls and mechanisms exist to deal with the long-term maintenance of Alternatives 2, 3, 5, and 6. Alternative 1 does not offer long-term effectiveness and permanence because no remedial action is implemented.

Reduction of Toxicity, Mobility, and Volume Through Treatment

Alternatives 1, 2, 3, 4, 5, and 6 do not include treatment as an option. Therefore, none of the alternatives meet this criteria.

Short-term Effectiveness

Alternative 1 actually provides the best short-term effectiveness because with no action taking place, risks to workers or the environment during implementation does not exist. There are some short-term risks, potential fugitive dust and gas emissions, for Alternatives 2, 3, 4, 5, and 6. However, risks associated with the implementation of Alternatives 2, 3, 4, 5, and 6 can be mitigated with appropriate health and safety measures, engineering controls, and transportation procedures. Alternative 5 provides the best effectiveness in the short-term of 2, 3, 4, 5, and 6 because it can be implemented in approximately 6 months. Alternative 6 is next at approximately 10 months. The remaining alternatives could take up to year. Obviously, shorter timeframes mean less chances for exposure.

Implementability

Alternative 1 is easier to implement as no action is required. However, even though Alternatives 2, 3, 4, 5, and 6 would be more difficult to implement, since they involve excavation, handling, transportation, and disposal of radioactive materials, they are technically and administratively feasible. In addition, services and materials to perform the actions are available.

State Acceptance

The State of Illinois does not concur with the selection of Alternative 6 as described in Section 12.0 Selected Remedies of this ROD. However, see Section 14.0 Documentation of Significant Changes, for a fuller discussion of the State's position.

Community Acceptance

The community has indicated that it supports Alternatives 4 and 6.

Cost

- Alternative 1 has no cost, since there is no action.
- Alternative 3 has a total present worth cost of $4,830,000 and associated O&M costs of $870,000.
- Alternative 2 has a total present worth of $5,410,000 and associated O&M costs of $870,000.
- Alternative 5 has a total present worth of $20,850,000 and associated O&M costs of $430,000.
- Alternative 6 has a total present worth of $32,540,000 and associated O&M costs of $430,000.
- Alternative 4 has a total present worth of $43,020,000 and no associated O&M costs.

10.5 Comparative Analysis for NPL-9

Because U.S. EPA determined that residential land use would be a reasonable assumption for future use of NPL-9, U.S. EPA considered alternatives that would be appropriate for residential use. Table 11 provides a summary of the comparative analysis for NPL-9.

U.S. EPA evaluated two alternatives for NPL-9:

- <u>Alternative 1 - No Action</u>

- <u>Alternative 2 - Excavation, Backfill, and Off-Site Disposal of Soil Contaminated with Radium-226, and, if necessary, Soils Contaminated with Organic and/or inorganic Chemicals</u> - Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals and may need to be disposed of at an off-site landfill. Off-site disposal of soils with organic and/or inorganic contamination would occur in accordance with applicable federal and state regulations. Additional sampling will be conducted as pre-design activities at NPL-9 to determine the extent of chemical contamination and assess the need to further remediate soils contaminated with organic and/or inorganic chemicals.

<u>Overall protection of human health and the environment</u>

Alternative 2 is more protective than the no action alternative. It removes the uncertainty of future exposure risks, eliminates long-term management, and allows unrestricted residential use of the property. There are some short-term health risks associated with excavation, transportation, and disposal of radium contaminated soils; however, these risks can be managed with appropriate health and safety measures, engineering controls, and transportation procedures.

<u>Compliance with ARARs</u>

Alternative 2 complies with ARARs by reducing risks associated with exposure to radium-226. Alternative 1 does not comply with ARARs.

<u>Long-term Effectiveness and Permanence</u>

Alternative 2 offers the most long-term effectiveness and permanence because soils contaminated with radium-226 will be removed from the site. No long-term management would be required and the uncertainty of future exposure risks is removed. Alternative 1 does not offer long-term effectiveness and permanence because no remedial action is implemented.

<u>Reduction of Toxicity, Mobility, and Volume Through Treatment</u>

Alternatives 1 and 2 do not include treatment as an option. Therefore, none of the alternatives meet this criteria.

Short-term Effectiveness

Alternative 1 actually provides better short-term effectiveness because with no action taking place, risks to workers or the environment during implementation does not exist. However, risks associated with the implementation of Alternative 2, potential fugitive dust and gas emissions, can be mitigated with appropriate health and safety measures, engineering controls, and transportation procedures.

Implementability

Alternative 1 is easier to implement as no action is required. However, even though Alternative 2 would be more difficult to implement, since it involves excavation, transportation and disposal of radioactive materials, it is technically and administratively feasible. In addition, services and materials to perform the action are available.

State Acceptance

The State of Illinois does not concur with the remedy selected for NPL-9 as described in Section 12.0 Selected Remedies of this ROD. However, see Section 14.0 Documentation of Significant Changes, for a fuller discussion of the State's position.

Community Acceptance

The community has indicated that it supports Alternative 2.

Cost

Alternative 1 has no cost, since there is no action. Alternative 2 has a total present worth cost of $600,000 and has no associated O&M costs.

10.6 Illinois Power

Because of the size of the investigative area at the Illinois Power site and the small amount of contaminated soil discovered, U.S. EPA determined that the soil contaminated with radium-226 could be excavated and disposed off-site at a licensed radioactive material landfill in conjunction with the excavations at the other sites. U.S. EPA would conduct radon monitoring in the Illinois Power building, which lies adjacent to the excavated area, to determine if radon levels exceed permissible levels. If radon levels persist then a radon reduction system will be operated in the building and additional testing may need to be performed. Table 16 provides a cost estimate for Illinois Power.

Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals and may need to be disposed of at an off-site landfill. Off-site disposal of soils with organic and/or inorganic contamination would occur in accordance with applicable federal and state regulations. Additional sampling will be conducted as pre-design activities at the Illinois Power site to determine the extent of chemical contamination and assess the need to further remediate soils contaminated with organic and/or inorganic chemicals.

The State of Illinois does not concur with the remedy selected for the Illinois Power site as described in Section 12.0 Selected Remedies of this ROD. However, see Section 14.0 Documentation of Significant Changes, for a fuller discussion of the State's position.

11.0 Principal Threat Wastes

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes an expectation that U.S. EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP §300.430(a)(1)(iii)(A)). The principal threat concept is applied to the characterization of source materials at a Superfund site. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile. Wastes that U.S. EPA generally will consider to constitute principal threats include the following: (1) liquid source material, for example waste contained in drums, lagoons, or tanks; (2) mobile source material, for example surface or subsurface soil containing high concentrations of chemicals of concern that are mobile due to wind entrainment, volatilization, surface runoff, or subsurface transport; and (3) highly-toxic source material, for example buried drummed non-liquid wastes, buried tanks containing non-liquid wastes, or soils containing significant concentrations of highly toxic materials. Wastes that generally do not constitute principal threats include: non-mobile contaminated source material and low toxicity source material, for example surface soil containing chemicals of concern that generally are relatively immobile in air or ground water or contaminants of low to moderate toxicity. U.S. EPA has determined that the radium-226 at the Ottawa Radiation Areas NPL-1, 4, 8, 9, and Illinois Power is not a principal threat waste. However, U.S. EPA considers radium-226 to be the primary chemical of concern at the sites. U.S. EPA has established that the carcinogenic risks to human health due to potential future exposures at the sites are outside U.S. EPA's acceptable risk range. U.S. EPA defines the acceptable risk range as 1E-04 to 1E-06. As such, these risks provide a basis for remedial action and U.S. EPA selected options using a combination of off-site disposal and institutional controls.

12.0 Selected Remedies

12.1 NPL-1

U.S. EPA selected Alternative 2 as the remedy for Areas A and B on NPL-1. Alternative 2 provides the best balance of the nine criteria as compared to the no-action alternative.

Alternative 2 consists of excavation, backfill and off-site disposal. Excavation is planned for the areas marked on Figure 2. Initially, clean overburden from the earlier removal actions would be removed and staged for reuse as backfill. The estimated interval of radioactive soils range from four to nine feet bgs in Area A and from four to eight feet in Area B. Visual observations and radioactive screening would be used to determine when digging had reached radioactive contaminated soils. Soils contaminated with radium-226 above the clean-up level of 6.2 pCi/g would be excavated for shipment to an off-site licensed radioactive disposal facility. Volumes are estimated at 555 cy in Area A and 265 cy in Area B. Excavation for radiological contamination should be limited to areas defined by surrounding clean samples taken during the investigation. However, additional confirmational sampling and/or surveying will be done in the open hole. Appropriate controls will be implemented during excavation to ensure worker safety and prevent environmental releases. Efforts will also be made, as necessary, to reduce the volume of waste to be shipped off-site by separating material above the clean-up level from that below the level as effectively as possible. Holes will be filled with clean staged backfill and other offsite backfill as needed to return the site to grade. After backfilling, the areas will be reestablished with vegetative cover.

Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals and may need to be disposed of at an off-site landfill. Off-site disposal of soils with organic and/or inorganic contamination would occur in accordance with applicable federal and state regulations. Additional sampling will be conducted as pre-design activities at NPL-1 to determine the extent of chemical contamination. If the pre-design sampling indicates organic and/or inorganic chemicals are present outside the areas of radiological contamination at levels above a 1E-04 risk, then further remediation of the soils would be required. A clean-up standard would be developed as pre-design activities and an ESD or ROD Amendment, as appropriate, prepared to document the organic and/or inorganic soil clean-up standards to be used at the sites.

Limited areas of perched water were found during the investigation at NPL-1. If these areas are encountered during excavation, the perched water will be pumped from the area of excavation to a collection area using conventional dewatering equipment. Any perched water collected will be transported to a licensed off-site treatment, storage, and disposal facility.

Alternative 2 has a total present worth cost of $1,083,000, at a discount rate of 7%, and has no associated operation and maintenance (O&M) costs. A complete breakdown of the costs associated with this remedy is in Table 12.

U.S. EPA believes that implementation of the selected remedy at NPL-1 will return the site to unrestricted residential use by eliminating risk from exposure to soils contaminated with radium-226. The site could be available for residential use immediately upon completion of the remedy.

12.2 NPL-4

For NPL-4, U.S. EPA selected Alternative 3. The only significant difference between Alternatives 2 and 3 was the inclusion of volume reduction technologies and cost of the segmented gate system (SGS) into Alternative 3. Because of the extreme cost of transporting and disposing of radioactive materials, U.S. EPA believes it is important to reduce the volume of waste by separating the soils above and below the clean-up level as effectively as possible. U.S. EPA included the potential cost of volume reduction pilot studies and mobilization of an SGS in Alternative 3. U.S. EPA believes that if the SGS can achieve a volume reduction of 50% and can be used for all the sites. It could provide a benefit by reducing overall costs for the entire project. For that reason, U.S. EPA has selected Alternative 3, even though it is initially more expensive than Alternative 2, based on the possibility that the SGS will reduce overall project costs. However, there are other volume reduction technologies available, i.e. manual monitoring techniques, and if the SGS does not prove to be effective or is not a feasible option for use at all the sites, other methodologies will be considered.

Alternative 3 consists of clearing and grubbing of existing vegetation and any aboveground debris. All vegetation cleared will be cut, chipped, and disposed of at an off-site, licensed composting facility. Existing concrete foundations will be removed, broken-up, and staged onsite. The debris and concrete will be decontaminated, screened for radioactivity, and transported off-site for disposal at a local, licensed construction debris landfill.

If it is determined that the SGS is a feasible volume reduction technology for all the sites, a treatability study will be conducted to determine the volume reduction efficiency of the SGS. Two factors play an important role in determining the cost-effectiveness of the SGS. These two factors are also greatly dependent on each other. If one is not met, then the cost-effectiveness is greatly reduced and SGS becomes a less feasible option. The first factor is the quantity of soil requiring volume reduction. The larger the quantity the greater the return on the cost of renting and mobilizing the SGS equipment. If we are not able to utilize the SGS for all the sites, or at least NPL-4 and NPL-8, than the cost of mobilizing and renting the SGS for each individual site is too great. The second factor is the efficiency of the SGS. If the treatability study shows that the SGS can not achieve a reduction of 50% or greater, other volume reduction methodologies, like manual monitoring of radioactivity, will need to be considered.

Soil will be excavated using conventional mechanical excavation equipment. Excavated soil will be continuously monitored for radiation to prevent over-excavation of soil below the clean-up level for radium-226. Soils contaminated with radium-226 above the clean-up level of 6.2 pCi/g would be excavated for shipment to an off-site licensed radioactive disposal facility. U.S. EPA estimates approximately 15,000 cy of contaminated soil in Areas A and B will be excavated. Over-excavation and soil expansion may increase the volume. Soils below the clean-up level for radium will be tested and may also need to be shipped off-site for disposal at an appropriate waste facility depending on the chemical, particularly inorganics, content. Excavation should be limited to areas defined by surrounding clean samples taken during the investigation. However, additional confirmational sampling and/or surveying will be done in the open hole. The areas planned for excavation are shown on Figure 3. Appropriate controls will be implemented during excavation to ensure worker safety and limit environmental releases. Efforts will also be made to reduce the volume of waste to be shipped off-site, via SGS or manual monitoring, by separating material above the clean-up level from that below the level as effectively as possible. Holes will be filled with clean staged backfill and other off-site backfill as needed to return the site to grade. After backfilling, the areas will be re-established with vegetative cover.

Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals and may need to be disposed of at an off-site landfill. Off-site disposal of soils with organic and/or inorganic contamination would occur in accordance with applicable federal and state regulations. U.S. EPA believes that the organic and/or inorganic contamination is mostly co-located with the radiological contamination, since the sampling covered most of the fill area. However, there is an area to the south of the radiologically contaminated portion where additional sampling is needed to determine if organic and/or inorganic contamination extends into this area. The sampling will be done as pre-design activities. If the pre-design sampling indicates organic and/or inorganic chemicals are present outside the areas of radiological contamination at levels above a 1E-04 risk, then further remediation of the soils would be required. A clean-up standard would be developed as pre-design activities and an ESD or ROD Amendment, as appropriate, prepared to document the organic and/or inorganic soil clean-up standards to be used at the sites.

Site characterization of NPL-4 indicated the presence of perched water at depths greater than 10 ft bgs. Consequently, perched water is likely to be encountered during excavation in some areas. If these areas are encountered during excavation, the perched water will be pumped from the area of excavation to a collection area using conventional dewatering equipment and/or saturated soil will be placed in a soil staging pad to drain. Collected water will be pumped to an on-site perched water treatment system. The treatment system will be equipped with a filtration system to remove suspended solids, and if necessary, with an ion exchange system to remove dissolved radium-226. Treated water will be discharged to the City of Ottawa's wastewater treatment facility, if the water meets Ottawa's requirements. Any perched water collected that doesn't meet the city's requirements will be transported to a licensed off-site treatment, storage, and disposal facility or, if necessary, an NPDES discharge permit will be obtained. Collected solids or spent ion exchange resin will be screened for radioactivity and either disposed of with the contaminated soils or at another appropriate facility.

Alternative 3 has a total present worth cost of $9,700,000, including the cost of mobilizing and renting the SGS, at a discount rate of 7%, and has no associated operation and maintenance (O&M) costs. A complete breakdown of the costs associated with this remedy is in Table 13.

U.S. EPA believes that implementation of the selected remedy at NPL-4 will return the site to unrestricted residential use by eliminating risk from exposure to soils contaminated with radium-226. The site could be available for residential use immediately upon completion of the remedy.

12.3 NPL-8

U.S. EPA selected Alternative 6 as the remedy for addressing the radioactive contamination at NPL-8. The only significant differences between Alternatives 2 thru 6 are the long-term effectiveness of Alternative 4, cost, and future land use restrictions. Any differences between the long-term effectiveness of complete removal versus capping or partial removal, with regards to erosion potential along the river bank, could be mitigated by engineering controls and long-term operation and maintenance. Cost becomes a factor in that the U.S. EPA needs a compelling reason to choose a more expensive remedy when the alternatives are relatively equally balanced according to the nine criteria. Future land use restrictions became the compelling reason and decisive factor in determining the remedy for the site, particularly the future plans of the State of Illinois for the NPL-8 site. U.S. EPA eliminated the capping options, Alternatives 2 and 3, since they severely restrict the recreational use of the land, even though they were the least expensive alternatives. The size of the caps would basically encompass the entire property under a mound and limit the State's recreational options. U.S. EPA also eliminated Alternative 5, 5-foot excavation, the least costly of the removal alternatives, because of restrictions placed on the property. This option would leave large areas where buildings could not be sited because of radon gas and would restrict the introduction of many plants because the root structures may extend below 5 feet. We eliminated Alternative 4, complete excavation, because the additional cost associated with this option did not provide significantly more benefits in the form of protection of health or recreational land use. The U.S. EPA believes that the Alternative 6, 10-foot excavation, provides the best balance of the nine criteria. A 10-foot excavation would provide complete protection of human health and ecological systems, while also allowing fairly unrestricted recreational use over the majority of the property, except for a few areas where buildings could not be located.

Alternative 6 consists of clearing and grubbing of existing vegetation and debris. All vegetation cleared will be cut, chipped, and disposed of at an off-site, licensed composting facility. Existing debris and concrete will be decontaminated, screened for radioactivity, and transported off-site for disposal at a local, licensed construction debris landfill.

Soil will be excavated using conventional mechanical excavation equipment. Excavated soil will be continuously monitored for radiation to prevent over-excavation of soil below the clean-up level for radium-226. Soils contaminated with radium-226 above the clean-up level of 6.2 pCi/g would be excavated down to ten feet bgs for shipment to an off-site licensed radioactive disposal facility. U.S. EPA estimates approximately 76,000 cy of contaminated soil will be excavated. Over-excavation and soil expansion may increase the volume. Soils below the clean-up level for radium will be tested and may also need to be shipped off-site for disposal at an appropriate waste facility depending on the chemical, particularly inorganics, content. Excavation should be limited to areas defined by surrounding clean samples taken during the investigation but additional confirmational sampling and/or surveying will be done in the open hole. The areas planned for excavation are shown on Figure 4. Appropriate controls will be implemented during excavation to ensure worker safety and environmental releases. Efforts will also be made to reduce the volume of waste to be shipped off-site, via SGS or manual monitoring, by separating material above the clean-up level from that below the level as effectively as possible. Holes will be filled with clean staged backfill and other off-site backfill as needed to return the site to grade. After backfilling, the areas will be re-established with vegetative cover.

Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals and may need to be disposed of at an off-site landfill. Off-site disposal of soils with organic and/or inorganic contamination would occur in accordance with applicable federal and state regulations. U.S. EPA believes that the organic and/or inorganic contamination is mostly co-located with the radiological contamination, since the sampling covered the entire fill area.

During the investigation perched water was found at 15 feet bgs, we do not expect to encounter perched water during the excavation.

Alternative 6 will require institutional controls restricting future use of portions of the property. In certain areas of the site, excavation below ten feet bgs will be prohibited and restrictions will be placed on the siting of buildings. Groundwater monitoring may also be required. The State of Illinois as property owners will be responsible for enforcing institutional controls. In addition, the need for engineering controls to mitigate potential erosion along the riverbank will be evaluated as part of the remedial design and the long-term operation and maintenance of the property.

Alternative 6 has a total present worth cost of $32,970,000, at a discount rate of 7%. Associated operation and maintenance (O&M) costs are estimated at $430,000 over a period of 30 years. A complete breakdown of the costs associated with this remedy is in Table 14.

U.S. EPA believes that implementation of the selected remedy at NPL-8 will allow the State of Illinois to fulfill its future plans for the site. The site could be available for recreational use immediately upon completion of the remedy.

12.4 NPL-9

U.S. EPA selected Alternative 2 as the remedy for Areas A and B on NPL-9. Alternative 2 provides the best balance of the nine criteria as compared to the no-action alternative.

Alternative 2 consists of excavation, backfill and off-site disposal. Excavation is planned for the areas marked on Figure 5. In Area A clean overburden from the earlier removal actions would be removed and staged for reuse as backfill. Excavations may proceed to a depth of 11 feet bgs. In Area B, U.S. EPA will excavate historical fill material from the surface to a depth of three feet bgs. Visual observations and radioactive screening would be used to determine when digging had reached radioactive contaminated soils. Soils contaminated with radium-226 above the clean-up level of 6.2 pCi/g would be excavated for shipment to an off-site licensed radioactive disposal facility. Volumes are estimated at 300 cy in Area A and 80 cy in Area B. Excavation should be limited to areas defined by surrounding clean samples taken during the investigation but additional confirmational sampling and/or surveying will be done in the open hole. Appropriate controls will be implemented during excavation to ensure worker safety and prevent environmental releases. Efforts will also be made, as necessary, to reduce the volume of waste to be shipped off-site by separating material above the clean-up level from that below the level as effectively as possible. Holes will be filled with clean staged backfill and other off-site backfill as needed to return the site to grade. After backfilling, the areas will be re-established with vegetative cover.

Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals and may need to be disposed of at an off-site landfill. Off-site disposal of soils with organic and/or inorganic contamination would occur in accordance with applicable federal and state regulations. Additional sampling will be conducted as pre-design activities at NPL-9 to determine the extent of chemical contamination. If the pre-design sampling indicates organic and/or inorganic chemicals are present outside the areas of radiological contamination at levels above a 1E-04 risk, then further remediation of the soils would be required. A clean-up standard would be developed as pre-design activities and an ESD or ROD Amendment, as appropriate, prepared to document the organic and/or inorganic soil clean-up standards to be used at the sites.

Alternative 2 has a total present worth cost of $600,000, at a discount rate of 7%, and has no associated operation and maintenance (O&M) costs. A complete breakdown of the costs associated with this remedy is in Table 15.

U.S. EPA believes that implementation of the selected remedy at NPL-9 will return the site to unrestricted residential use by eliminating risk from exposure to soils contaminated with radium-226. The site could be available for residential use immediately upon completion of the remedy.

12.5 Illinois Power

Because of the size of the investigative area at the Illinois Power site and the small amount of contaminated soil discovered, U.S. EPA determined that the soil contaminated with radium-226 could be excavated and disposed off-site at a licensed radioactive material landfill in conjunction with the excavations at the other sites. U.S. EPA would conduct radon monitoring in the Illinois Power building, which lies adjacent to the excavated area, to determine if radon levels exceed permissible levels. If radon levels persist then a radon reduction system will be operated in the building and additional testing may need to be performed. Table 16 provides a cost estimate for the Illinois Power site.

Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals and may need to be disposed of at an off-site landfill. Off-site disposal of soils with organic and/or inorganic contamination would occur in accordance with applicable federal and state regulations. Additional sampling will be conducted as pre-design activities at the Illinois Power site to determine the extent of chemical contamination. If the pre-design sampling indicates organic and/or inorganic chemicals are present outside the areas of radiological contamination at levels above a 1E-04 risk, then further remediation of the soils would be required. A clean-up standard would be developed as pre-design activities and an ESD or ROD Amendment, as appropriate, prepared to document the organic and/or inorganic soil clean-up standards to be used at the sites.

13.0 Statutory Determinations

Under CERCLA Section 121 and the NCP, U.S. EPA must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements, are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the selected remedies meet these statutory requirements.

13.1 Protection of Human Health and the Environment

U.S. EPA has determined that each of its selected remedies would provide adequate protection by reducing risk to background or U.S. EPA's acceptable risk range through removal or a combination of removal and containment. In the case of remedies for NPL-1, 4, and 9, the selected remedies provide protection by reducing risk to future residential users through removal of soils contaminated with radium-226 above the clean-up level. For NPL-8 the selected remedy will provide protection by reducing risk to future recreational users through a combination of removal of soils contaminated with radium-226 above the clean-up level and containment of contaminated soils at a depth of ten feet bgs. Implementation of the selected remedy for NPL-8 will result in radioactive materials being left in place at depth (10 ft bgs) on portions of the property. Institutional controls at NPL-8 will be implemented to; (a) restrict future use of the property to recreational; (b) limit future excavation due to site development on a portion of the property to eight feet in depth; and (c) require radon reduction systems and monitoring in any buildings constructed on a portion of the property in the future.

13.2 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

U.S. EPA has determined that the selected remedies fully comply with ARARs. A complete list of ARARs for the Ottawa Radiation Areas is included in Table 17.

13.3 Cost-Effectiveness

In U.S. EPA's judgment, the selected remedies are cost-effective for mitigating the risks associated with exposure to soils contaminated with radium-226 at the sites. Section 300.430(f)(1)(ii)(D) of the National Contingency Plan (NCP) requires U.S. EPA to determine cost-effectiveness by evaluating the cost of an alternative relative to its overall effectiveness. The selected remedies provide effective protection of human health for the most reasonable potential future land use scenarios at each of the sites. For NPL-1, 4, 9 , and Illinois Power the selected remedies provide far greater protection than the no-action alternatives. In the case of NPL-8, the selected remedy provides as much or greater protection of human health than Alternatives 2, 3, and 5, and provides as much protection as Alternative 4, given future recreational use at the site, at a lower cost. U.S. EPA determined the relationship of the overall effectiveness of the selected remedies to be proportional to their costs and hence represent a reasonable value for the money to be spent.

13.4 Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable

U.S. EPA has determined that the selected remedies represent the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner. Permanent solutions in the form of removal and off-site disposal are being utilized at each of the sites.

13.5 Preference for Treatment as a Principal Element

The remedies in this ROD do not satisfy the statutory preference for treatment as a principal element in the remedies. U.S. EPA has determined that the radium-226 contamination does not meet characteristics of materials requiring treatment as described in OSWER Directive 9380.3-06FS entitled "A Guide to Principal Threat and Low Level Threat Wastes". Therefore, options utilizing a combination of off-site disposal and institutional controls were selected.

13.6 Five-Year Review Requirements

The selected remedy for NPL-8 will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure. Therefore, U.S. EPA will conduct a review within five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

14.0 Documentation of Significant Changes

The Proposed Plan for the Ottawa Radiation Areas NPL- 1, 4, 8, 9 and the Illinois Power Building was released for public comment in February 2000. The Proposed Plan identified excavation, backfilling, and off-site disposal as remedies for NPL-1, 4, 9, and Illinois Power and excavation to a depth of ten feet bgs, backfill, and off-site disposal for the remedy at NPL-8. U.S. EPA reviewed all written and verbal comments submitted during the public comment period.

On April 27, 2000, the IDNS, on behalf of the State of Illinois, submitted comments on the Draft Proposed Plan. These comments contained a number of concerns, viewpoints, and recommendations regarding the U.S. EPA's proposed remedies for the Ottawa sites.

A detailed summary of the State's comments and the U.S. EPA's response is included in the Responsiveness Summary, Appendix A, of this ROD. In particular, U.S. EPA's addresses the issues of and responds to the State's viewpoints concerning the protectiveness of the remedy selected for NPL-8 and ARAR compliance in Sections 10.0 and 13.0 of this ROD and in Comments 5, 11, 16, 25, 26, and 35 in the Section entitled Comments from the State of Illinois of the Responsiveness Summary.

14.1 Summary of State's Comments

Significant State comments included.

- The State's recommendation that the State of Illinois assume the lead for the remedial design and remedial action (RD/RA) at all the Ottawa sites (See Comment 28 of the Responsiveness Summary);

- Concerns about the need for additional characterization of chemical contamination at the sites (See Comment 40 of the Responsiveness Summary and Section 12.0 of this ROD);

- Concerns about the adequacy of characterization to define the extent of radioactive contamination conducted at all the sites and the recommendation to implement a more comprehensive three-dimensional characterization (See Comments 8, 18, 29, 30, 31, and 42 of the Responsiveness Summary and Sub-Section 5.1 of this ROD);

- Concerns about the costs and implementation of the segmented gate system for volume reduction, and the recommendation that the system not be used at the Ottawa sites (See Comment 9 of the Responsiveness Summary and Sub-Section 12.2 of this ROD);

- Clarification regarding (a) collection and treatment of perched water; and (b) use of excavated material with radium levels below the clean-up level backfill (See Comments 12, 13, 33, 39, and 41 of the Responsiveness Summary and Sub-Sections 12.1 and 12.2 of this ROD);

- Concerns about the location of NPL-8 along the bank of the Fox River and the potential for erosion along that bank (See Comment 27 of the Responsiveness Summary);

! The viewpoint that rather than Alternative 6, Alternative 4, as it would be implemented by the State at NPL-8, would be the Alternative that the State would choose to protect the public health and safety and to comply with the State's environmental standards and regulations (See Comments 5, 16, 26, and 35 of the Responsiveness Summary and Sections 10.0 and 13.0 of this ROD);

! The viewpoint that the contaminated material below ten feet at NPL-8 should be excavated by implementing betterments achievable at a reasonable cost (betterment is described in Sub-Section 14.2 of this ROD); and

! The viewpoint that the Alternative 4, rather than Alternative 6, for NPL-8 is the only alternative that meets the ARARs that the State submitted on January 29, 1999 for use at NPL-8 (See Comments 5, 11, 16, 25, and 35 of the Responsiveness Summary and Sections 10.0 and 13.0 of this ROD).

The State's concerns, viewpoints, and recommendations are set forth in the State's April 27, 2000 Proposed Plan comments.

14.2 Summary of U.S. EPA's Responses

U.S. EPA believes many of the State's recommendations already are part of the selected remedies or can be incorporated as supplemental work into U.S. EPA's selected remedies.

U.S. EPA intends to determine the lead agency for the next phase of the Ottawa projects as part of the RD/RA negotiations.

Some soils at the site contain, in addition to radiological contaminants, organic and/or inorganic chemicals. Additional sampling will be conducted as pre-design activities at NPL-1, 4, 9, and Illinois Power site to determine the extent of chemical contamination. If organic and/or inorganic chemical contamination requires further remediation beyond the area of defined radiological contamination, this Record of Decision (ROD) will be modified through either an Explanation of Significant Differences (ESD) or ROD Amendment as appropriate.

U.S. EPA has determined that enough data exists on radioactive contamination at the sites to warrant a remedial action. However, additional characterization in areas where radioactive contamination has already been identified to help define the area to be excavated can be incorporated. Methodologies for the additional radioactive characterization, including three-dimensional projection and the use of health physicists may be determined in more detail as part of detailed remedial design work plans.

U.S. EPA understands the State's concerns with the segmented gate system, but believes the emphasis in the selected remedies should be on the use of the most effective form of volume reduction. As such, U.S. EPA believes that the segmented gate system should at least be pilot tested to determine its effectiveness and potential cost savings for the remedial action.

U.S. EPA agrees that perched water may need to be collected and treated as part of excavation activities. U.S. EPA's selected remedies contain a measure to collect and treat perched water when and if it is encountered.

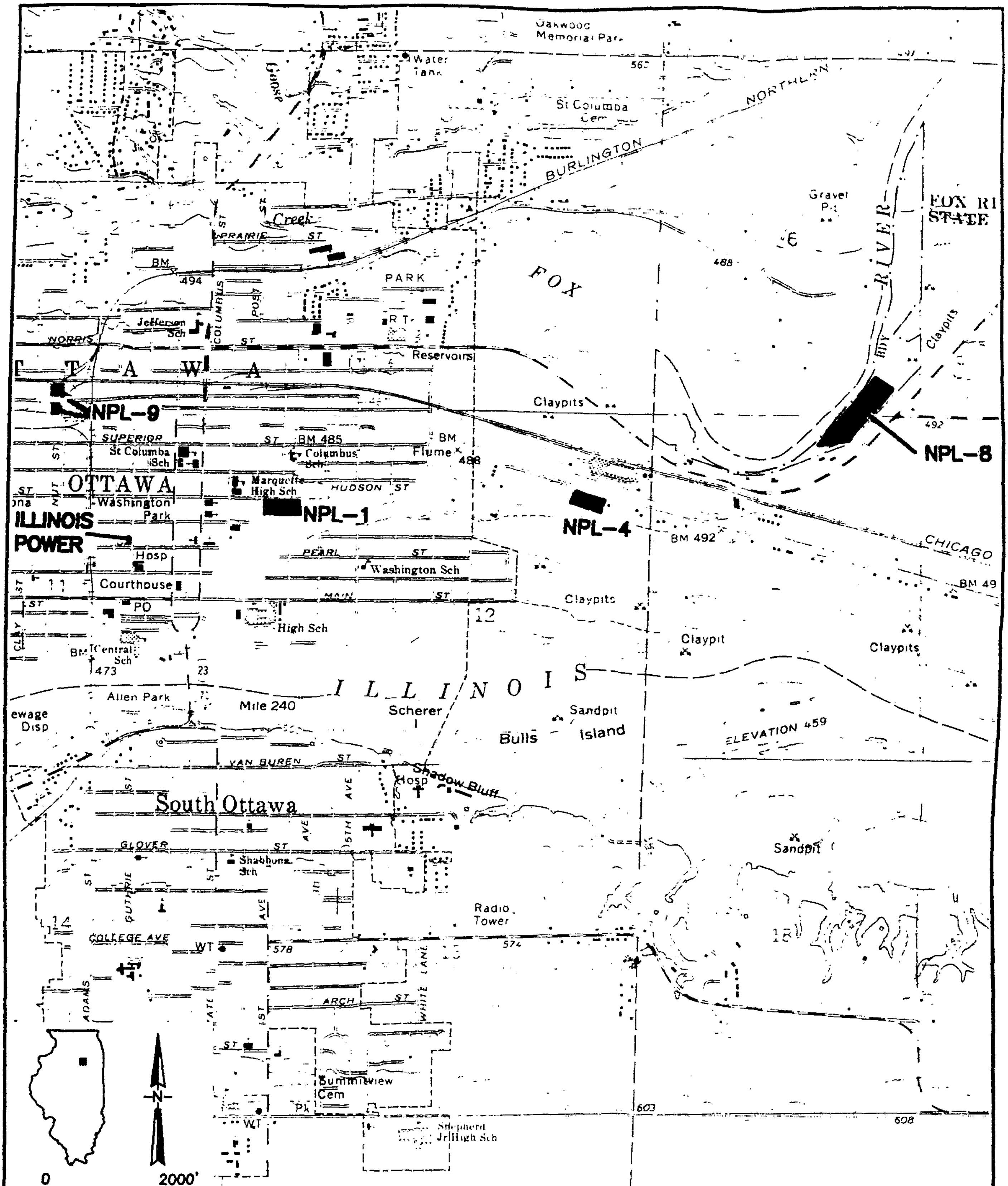
It is also U.S. EPA's intent to re-use as much material as possible for backfilling. Material below the radioactive clean-up level of 6.2 pCi/g will be used for backfill whenever possible. However, it is important to note that chemical contamination also exists at the sites and therefore soils may need to be tested further and the specifics of their re-use need to be clearly defined in remedial design work plan documents.

U.S. EPA has determined that an evaluation of the need to develop engineering controls along the bank of the Fox River to help mitigate potential erosion may be incorporated during the remedial design of the U.S. EPA's selected remedy for NPL-8.

With regards to many of the State's comments on NPL-8, U.S. EPA has determined that the State may implement betterment of the U.S. EPA's selected remedy for NPL-8 by implementing Alternative 4. U.S. EPA's determination in this regard does not affect or diminish the fact that the selected remedy for NPL-8 set forth in this ROD is protective and satisfies the applicable statutory and regulatory criteria and requirements. Betterment, in this case, involves remedial action for the contaminated material below 10 feet at NPL-8 to allow for unrestricted use of the property. U.S. EPA's remedy was selected to allow for unrestricted recreational use.

If the State of Illinois conducts a remedial action for the contaminated material below 10 feet at NPL-8, this action is not required pursuant to this ROD and is not eligible for fund-financing under CERCLA. This action may be undertaken if it is not inconsistent with the remedy selected in this ROD.

FIGURES



SOURCE: U.S.G.S. 7.5 MINUTE TOPOGRAPHIC MAPS.
OTTAWA, ILLINOIS QUADRANGLE.

FIGURE 1

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Three Hawthorn Parkway
Vernon Hills, Illinois
60061

SITE LOCATION MAP FOR
NPL-1, NPL-4, NPL-8, NPL-9
AND ILLINOIS POWER
Ottawa, Illinois

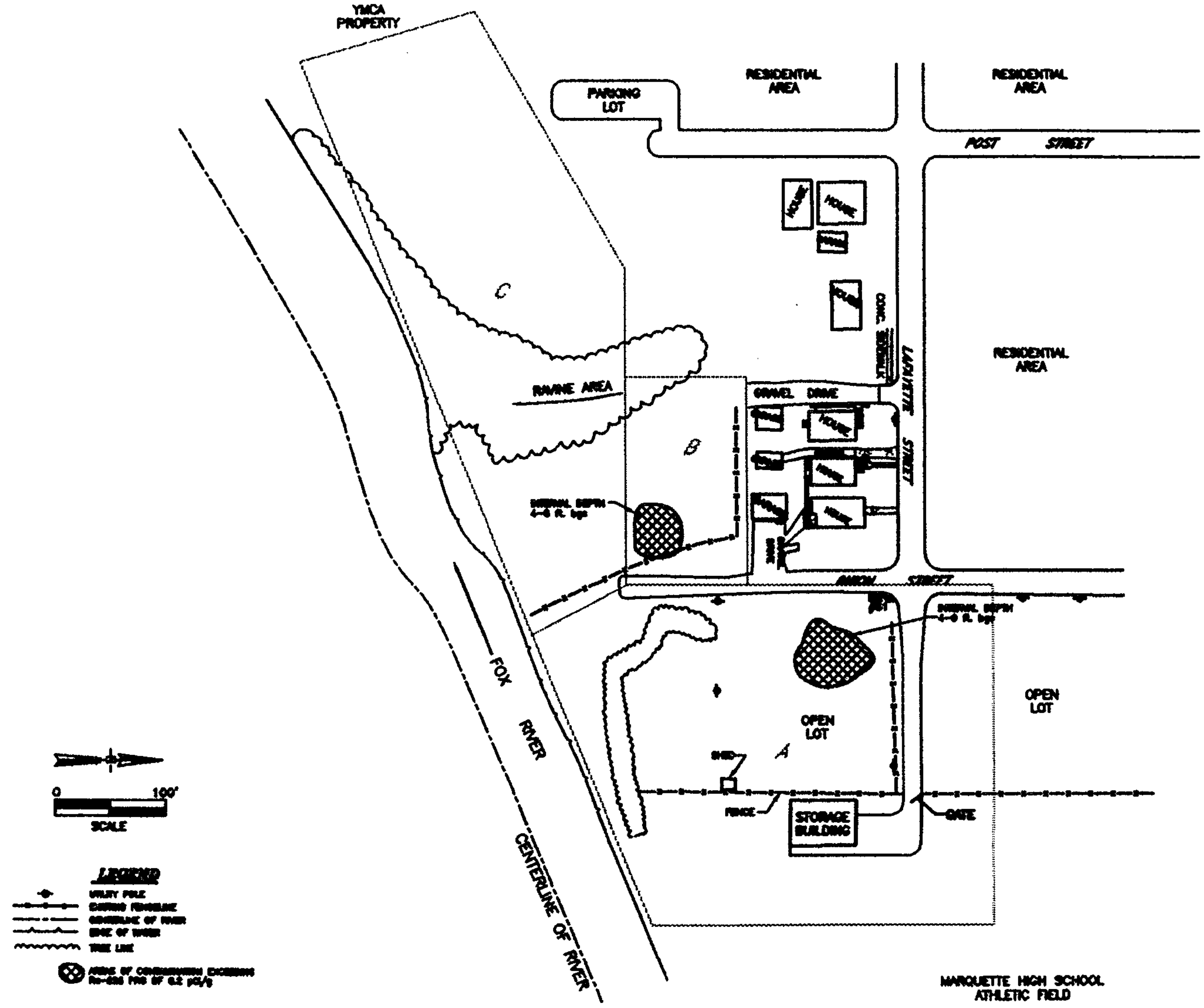


FIGURE	2

RESPONSE ACTION CONTRACT	SITE MAP
U.S. EPA CONTRACT No. 68-W7-0026	NPL-1 SITE
WORK ASSIGNMENT No. 011-NSBN-059Z	Ottawa, Illinois
DOCUMENT CONTROL NO. RFW011-2A-ADFH	

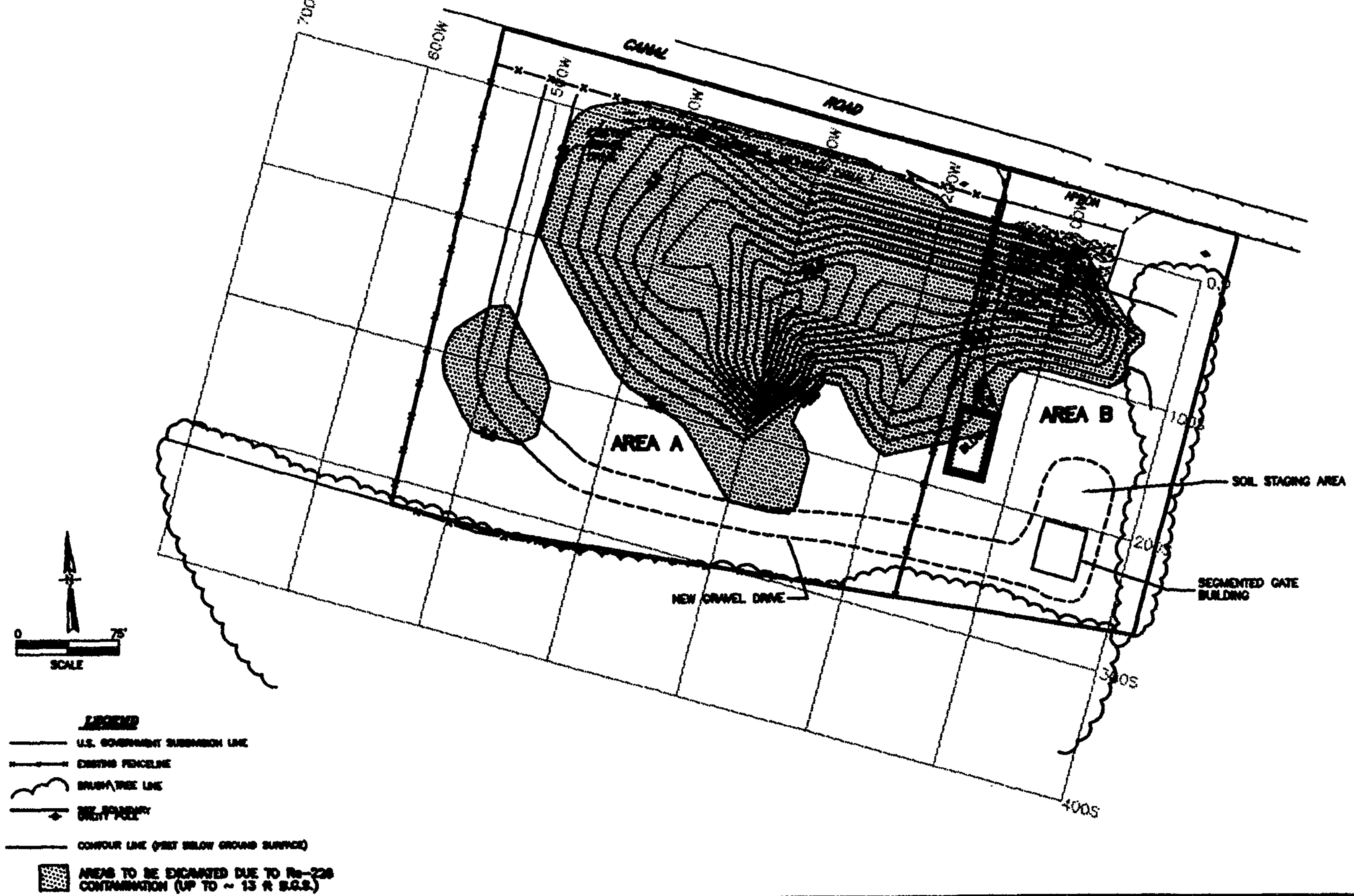


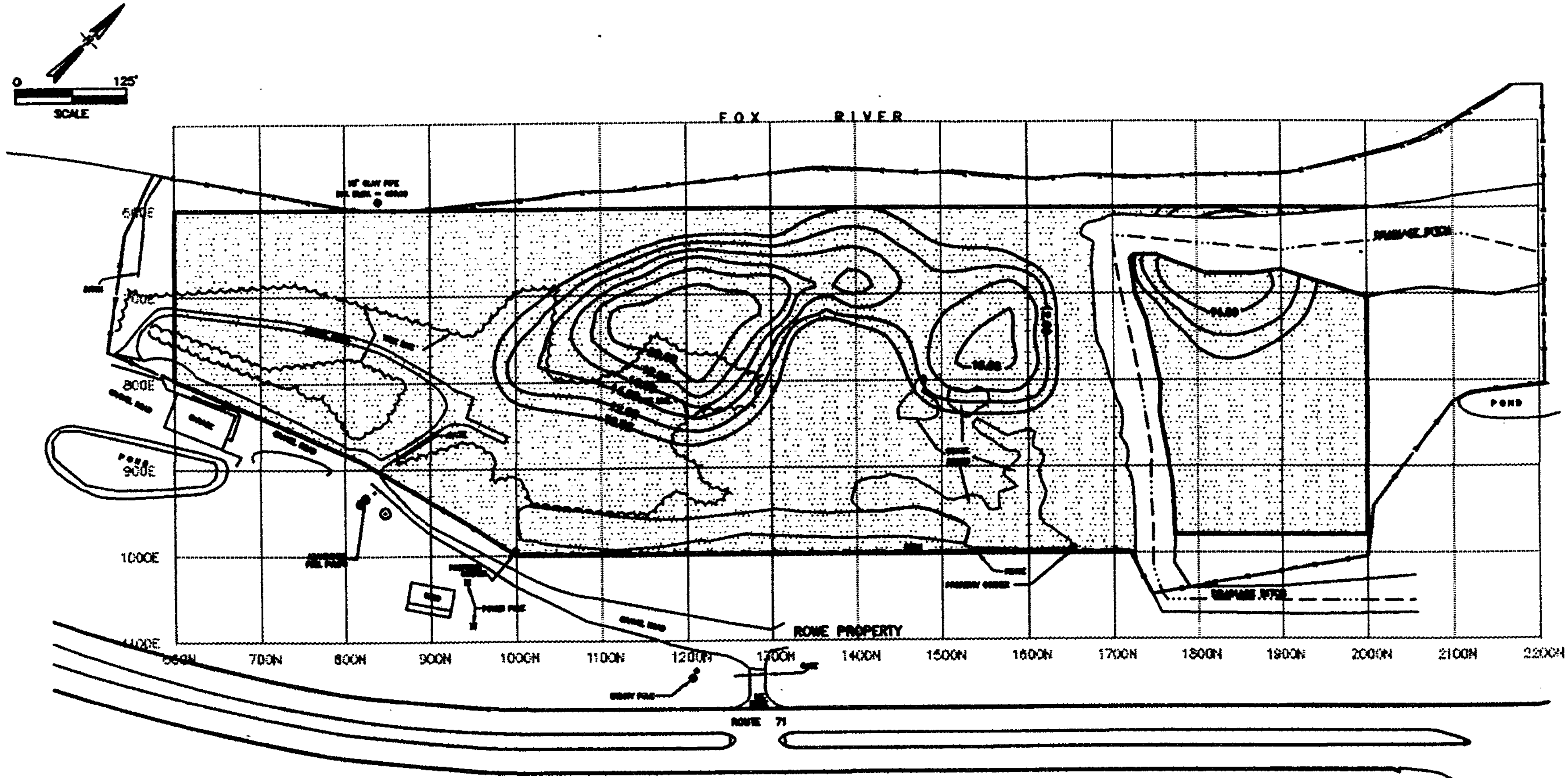
FIGURE 3

RESPONSE ACTION CONTRACT

U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. 011-NSBN-059Z
DOCUMENT CONTROL No. RFW011-2A-ACDB

SITE MAP

NPL-4 SITE
Ottawa, Illinois



LEGEND

PROPERTY LINE (APPROXIMATE)

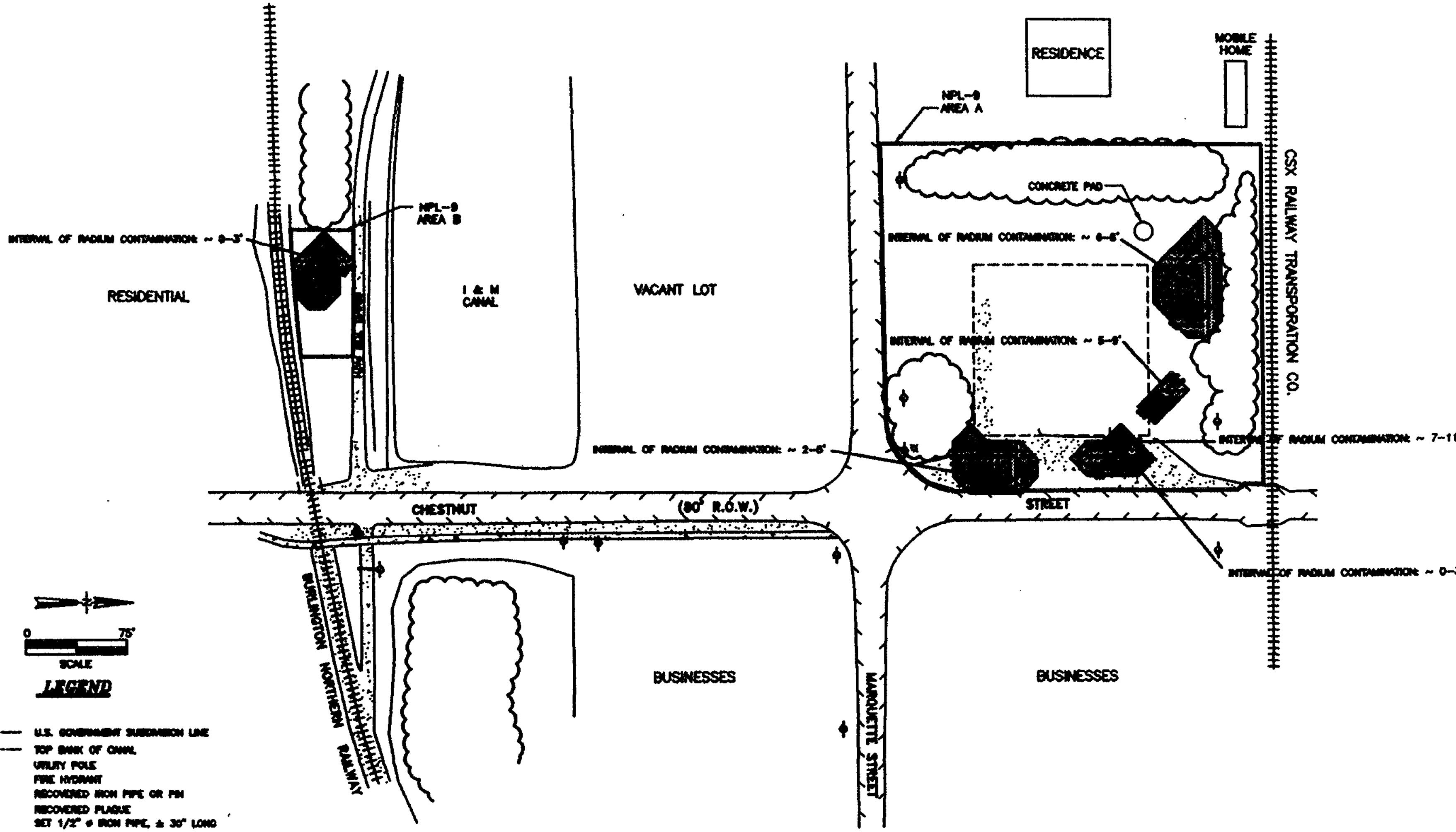
INDICATES AREA OF EXCAVATED SOIL THAT IS TRANSPORTED OFF-SITE FOR DISPOSAL AND RETURNED TO EXISTING GRADE.

INDICATES DEPTH OF SOIL BELOW 10 FEET, LEFT IN PLACE.

FIGURE 4

RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. 016-RICO-059Z
DOCUMENT CONTROL No. RFW016-2A-ACSN

SITE MAP
NPL-8
Ottawa, Illinois



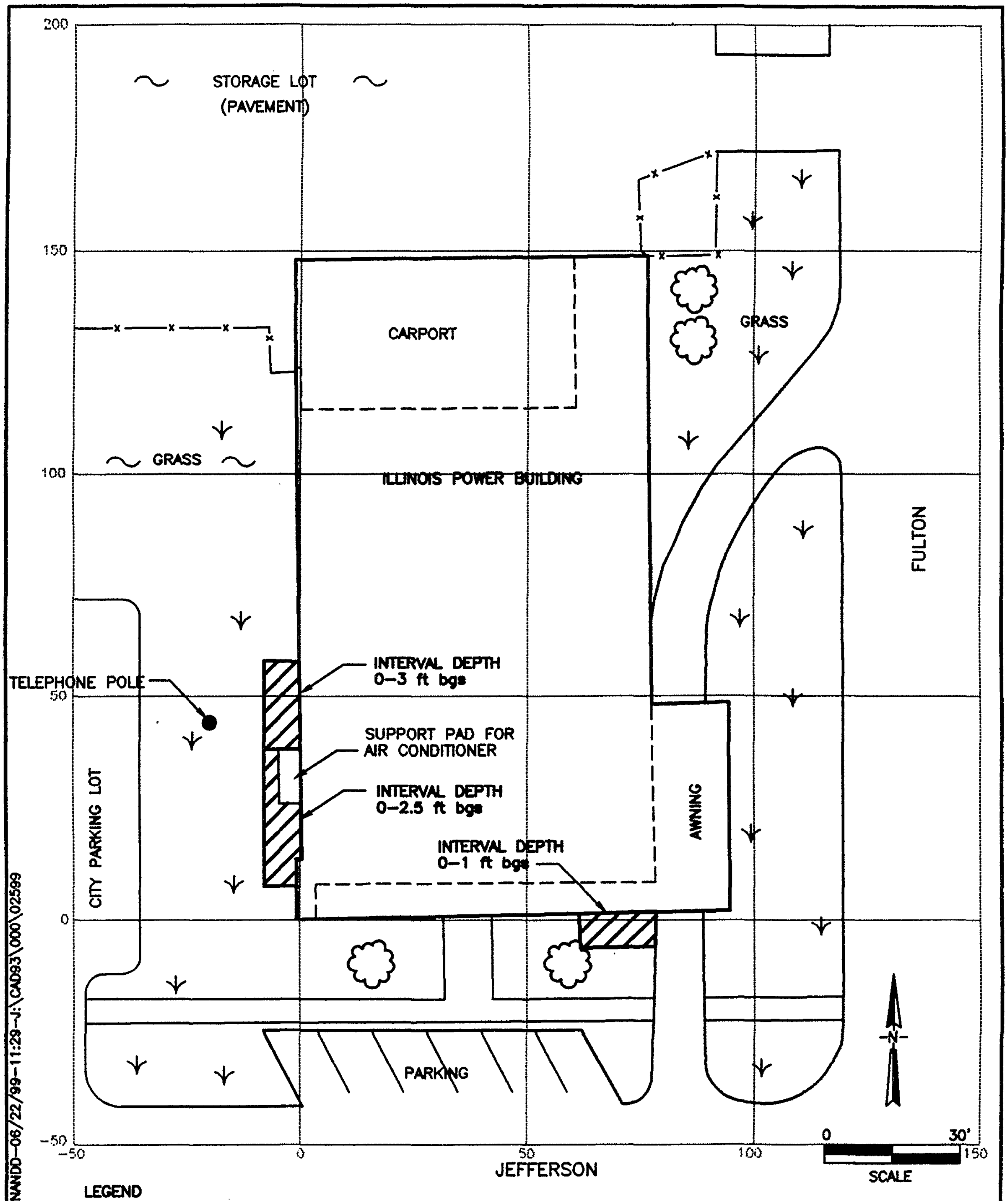
LEGEND

- U.S. GOVERNMENT SUBDIVISION LINE
- TOP BANK OF CANAL
- UTILITY POLE
- FIRE HYDRANT
- RECOVERED IRON PIPE OR PIN
- RECOVERED PLAQUE
- SET 1/2" ⌀ IRON PIPE, ± 30" LONG
- GRAVEL
- TREE LINE
- SITE BOUNDARY
- APPROXIMATE LOCATION OF PRIOR EXCAVATION
- DEPTH CONTOUR (FEET BELOW GROUND SURFACE)
- EXCAVATION AREA

HERNANDO-07/21/98-1408-JJ\CADD\5\205\21897

NOTE:
EXTENT OF SOIL CONTAMINATED WITH RADIUM-226 WAS DETERMINED USING LABORATORY ANALYSIS OF SOIL RADIUM-226 CONTENT, DOWNHOLE GAMMA RADIATION READINGS, AND GM PANCAKE READINGS OF SAMPLE CORE.

RESPONSE ACTION CONTRACT U.S. EPA CONTRACT No. 68-W7-0026 WORK ASSIGNMENT No. 011-NSBN-059Z DOCUMENT CONTROL No. RFW011-2A-ACDA	FIGURE 5 SITE MAP NPL-9 SITE Ottawa, Illinois



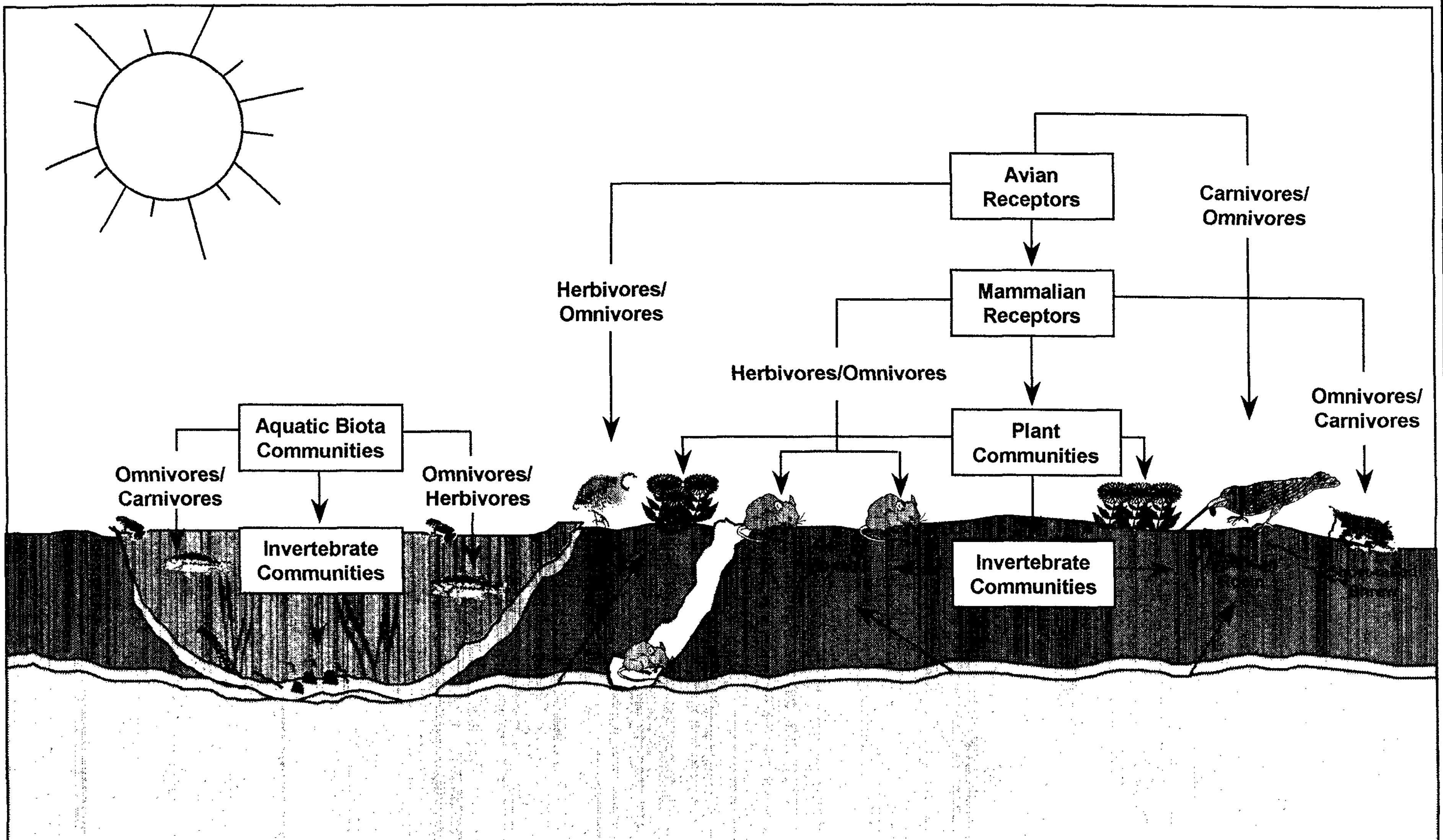
LEGEND

SOIL CONTAMINATED WITH RADIUM-226

FIGURE 6

RESPONSE ACTION CONTRACT
U.S. EPA CONTRACT No. 68-W7-0026
WORK ASSIGNMENT No. 011-NSBN-059Z
DOCUMENT CONTROL No. RFW011-2A-ACMG

SITE MAP
ILLINOIS POWER SITE
Ottawa, Illinois



Ottawa Radiation Areas

Receptor and Community Feeding Relationships Model

TABLES

TABLE 1a
VALUES USED FOR DAILY INTAKE CALCULATIONS
OTTAWA RADIATION AREAS: NPL-1, NPL-4, NPL-8, NPL-9, AND ILLINOIS POWER

Scenario Timeframe:	Current/Future
Medium:	Surface soil
Exposure Medium:	Surface soil
Exposure Point	Surface soil

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Adult Resident								
Ingestion	CS	Chemical concentration in soil	pCi/g or mg/kg	chemical specific	chemical specific	chemical specific	chemical specific	CDI (pCi)=CS x 1E-03 g/mg x EF x ED
	IR-S	Ingestion rate of soil	mg/day	100	EPA, 1991c	100	EPA, 1991c	
	EF	Exposure frequency	days/yr	350	EPA, 1991c	350	EPA, 1991c	CDI (mg/kg/d) = CS x IR x 1E-03 g/mg x EF x ED x 1/BW x 1/AT
	ED	Exposure duration	yrs	24	EPA, 1991c	6	Professional judgement	
	BW	Body weight	kg	70	EPA, 1991c	70	EPA, 1991c	
	AT-C	Averaging time (cancer)	yrs	25550	EPA, 1991c	25550	EPA, 1991c	
	AT-NC	Averaging time (non-cancer)	yrs	8760	EPA, 1991c	2555	EPA, 1991c	
Dermal absorption	CS	Chemical concentration in soil	pCi/g or mg/kg	chemical specific	chemical specific	chemical specific	chemical specific	CDI (pCi) = CS x IR x 1E-03 g/mg x EF x ED
	SA	Surface area available for contact	cm2	5800	EPA, 1992a	5000	EPA, 1992a	
	PC	Permeability constant	cm/hr	0.001 (inorganics); chemical-specific (organics)	EPA, 1997	0.001 (inorganics); chemical-specific (orgnanics)	EPA, 1997	CDI (mg/kg/d) = CS x IR x 1E-03 g/mg x EF x ED 1/BW x 1/AT
	EF	Exposure frequency	days/yr	350	EPA, 1991c	350	EPA, 1991c	
	ED	Exposure duration	yrs	24	EPA, 1991c	7	Professional judgement	
	BW	Body wight	kg	70	EPA, 1991c	70	EPA, 1991c	
	AT-C	Averaging time (cancer)	yrs	25550	EPA, 1991c	25550	EPA, 1991c	
	AT-NC	Averaging time (non-cancer)	yrs	8760	EPA, 1991c	2555	EPA, 1991c	

TABLE 1a
VALUES USED FOR DAILY INTAKE CALCULATIONS
OTTAWA RADIATION AREAS: NPL-1, NPL-4, NPL-8, NPLE-9, AND ILLINOIS POWER

Scenario Timeframe:	Current/Future
Medium:	Surface soil
Exposure Medium:	Surface soil
Exposure Point:	Surface soil

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation of particulates	CS	Chemical concentration in soil	pCi/g or mg/kg	chemical specific	chemical specific	chemical specific	chemical specific	CDI (pCi) =CS x IR x 1E+03 g/mg x EF x ED x 1/PEF
	IR-A	inhalation rate of air	m3/day	20	EPA, 1991c	13.25	EPA, 1997	CDI (mg/kg-d) = CS x IR x 1E+03 g/mg
	EF	Exposure frequency	day/yr	350	EPA, 1991c	350	EPA, 1991c	x EF x ED x 1/PEF x 1/BW x 1/AT
	ED	Exposure duration	yrs	24	EPA, 1991c	7	Professional judgement	
	BW	Body weight	kg	70	EPA, 1991c	70	EPA, 1991c	
	AT-C	Averaging time (cancer)	yrs	25550	EPA, 1991c	25550	EPA, 1991c	
	AT-NC	Averaging time (non-cancer)	yrs	8760	EPA, 1991c	2555	EPA, 1991c	
	PEF	Particulate emission factor	yrs	1.32E+009	IEPA, 1997	1.32E+009	IEPA, 1997	
Inhalation of radon outdoors	CS	Chemical concentration in soil	pCi/g or mg/kg	chemical specific	chemical specific	chemical specific	chemical specific	CDI(pCi) = CS x IR x EF x ED x (ET-o x VF-o)
	IR-A	Inhalation rate of air	m3/day	20	EPA, 1991c	13.25	EPA, 1997	
	ET-o	Exposure time fraction - outdoors	unitless	0.02	EPA, 1994d	0.02	EPA, 1994d	
	EF	exposure frequency	day/yr	350	EPA, 1991c	350	EPA, 1991c	
	ED	Exposure duration	yrs	24	EPA, 1991c	7	Professional judgement	
	BW	Body weight	kg	70	EPA, 1991c	70	EPA, 1991c	
	AT-C	Averaging time (cancer)	yrs	25550	EPA, 1991c	25550	EPA, 1991c	
	AT-NC	Averaging time (non-cancer)	yrs	8760	EPA, 1991c	2555	EPA, 1991c	
	VF-o	Volatilization factor for radon - outdoor	pCi/m3/pCi/g	1.20E+002	EPA, 1994D	1.20E+002	EPA, 1994d	
External Exposure	CS	Chemical concentration in soil	pCi/g	chemical specific	Chemical specific	chemical specific	chemical specific	CDE (pCi) = (CS x ET x EF x ED) x (1-SH) / 8760 hr/yr
	ET	Exposure time	hrs/day	24	EPA, 1991c	16	Professional judgement	
	EF	Exposure frequency	days/yr	350	EPA, 1991c	350	EPA, 1991c	
	ED	Exposure duration	yrs	24	EPA, 1991c	7	Professional judgement	
	SH	Shielding factor	unitless	0.4	EPA, 1996a	0.4	EPA, 1996a	

TABLE 1a
VALUES USED FOR DAILY INTAKE CALCULATIONS
OTTAWA RADIATION AREAS: NPL-1, NPL-4, NPL-8, NPL-9, AND ILLINOIS POWER

Scenario Timeframe:	Current/Future
Medium:	Surface soil
Exposure Medium:	Surface soil
Exposure Point:	Surface soil

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Child Resident								
Ingestion	CS	Chemical concentration in soil	pCi/g or mg/kg	chemical specific	chemical specific	chemical specific	Chemical specific	CDI (pCi) = CS x IR x 1E-03 g/mg/ x EF x ED
	IR-S	Ingestion rate of soil	mg/day	200	EPA 1991c	200	EPA 1991c	CDI (mg/kg/d) = CS x IR x 1e-03 g/mg x EF x ED x 1/BW x 1/AT
	EF	Exposure frequency	days/yr	350	EPA 1991c	350	EPA 1991c	
	ED	Exposure duration	yrs	24	EPA 1991c	7	Professional judgement	
	BW	Body weight	kg	15	EPA 1991c	15	EPA 1991c	
	AT-C	Averaging time (cancer)	yrs	25550	EPA 1991c	25550	EPA 1991c	
	AT-NC	Averaging time (non-cancer)	yrs	2190	EPA 1991c	730	EPA 1991c	
Dermal absorption	CS	Chemical concentration in soil	pCi/g or mg/kg	chemical specific	chemical specific	chemical specific	chemical specific	CDI (pCi) = CS x IR x 1E-03 g/mg x EF x ED
	SA	Surface area available for contact	cm2	2600	EPA, 1992a	1800	EPA, 1992a	
	PC	Permeability constant	cm/hr	0.001 (inorganics); chemical specific (organics)	EPA, 1997	0.001 (inorganics); chemical-specific (organics)	EPA, 1997	CDI (mg/kg/d) = CS x IR x 1E-03 g/mg x EF x ED x 1/BW x 1/AT
	EF	Exposure frequency	days/yr	350	EPA, 1991c	350	EPA, 1991c	
	ED	Exposure duration	yrs	6	EPA, 1991c	2	Professional judgement	
	BW	Body weight	kg	15	EPA, 1991c	15	EPA, 1991c	
	AT-C	Average time (cancer)	yrs	25550	EPA, 1991c	25550	EPA, 1991c	
	AT-NC	Averaging time (no-cancer)	yrs	2190	EPA, 1991c	730	EPA, 1991c	

TABLE 1a
VALUES USED FOR DAILY INTAKE CALCULATIONS
OTTAWA RADIATION AREAS: NPL-1, NPL-4, NPL-8, NPL-9, AND ILLINOIS POWER

Scenario Timeframe:	Current/Future
Medium:	Surface soil
Exposure Medium:	Surface soil
Exposure Point	Surface soil

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation of particulates	CS	Chemical concentration in soil	pCi/g or mg/kg	Chemical specific	chemical specific	chemical specific	chemical specific	CDI (pCi) = CS x IR x 1E+03 g/mg x EF x ED x 1/PEF
	IR-A	Inhalation rates of air	m3/day	12	EPA, 1991c	7.55	EPA, 1997	
	EF	Exposure frequency	day/yr	350	EPA, 1991c	350	EPA, 1991c Professional	CDI mg/kg-d) = CS x IR x 1E+03 g/mg x EF x ED x 1/PEF x 1/BW x 1/AT
	ED	Exposure duration	yrs	6	EPA, 1991c	2	judgement EPA, 1991c	
	BW	Body weight	kg	15	EPA, 1991c	15	EPA, 1991c	
	AT-C	Average time (cancer)	yrs	25550	EPA, 1991c	25550	EPA, 1991c	
	AT-NC	Average time (non-cancer)	yrs	219	EPA, 1991c	730	IEPA, 1997	
	PEF	Particulate emission factor	yrs	1.32+009	IEPA, 1997	1.32+009		
Inhalation of radon outdoors	CS	Chemical concentration in soil	pCi/g or mg/kg	chemical specific	chemical specific	chemical specific	chemical specific	CDI (pCi) = CS x IR x EF x ED x (ET-o x VF - o)
	IR-A	Inhalation rate of air	m3/day	12	EPA, 1991c	7.55	EPA, 1997	
	ET-o	Exposure time factor - outdoors	unitless	0.02	EPA, 1994d	0.02	EPA, 1994d	
	EF	Exposure frequency	day/yr	350	EPA, 1991c	350	EPA, 1991c	
	ED	Exposure duration	yrs	6	EPA, 1991c	2	Professional judgement	
	BW	Body weight	kg	15	EPA, 1991c	15	EPA, 1991c	
	AT-C	Averaging time (cancer)	yrs	25550	EPA, 1991c	25550	EPA, 1991c	
	AT-NC	Average time (non-cancer)	yrs	2190	EPA, 1991c	730	EPA, 1991c	
	VF-o	Volatilization factor for random -outdoor	pCi/m3/pCi/g	1.20E+002	EPA, 1994d	1.20E+002	EPA, 1994d	
External Exposure	CS	Chemical concentration in soil	pCi/g or mg/kg	chemical specific	chemical specific	chemical specific	chemical specific	CDE (pCi) = CS x ET x EF x ED) x (1-SH) /8760 hr/yr
	ET	Exposure time	hrs/day	24	EPA, 1991c	16	Professional judgement	
	EF	Exposure frequency	days/yr	350	EPA, 1991c	350	EPA, 1991c Professional	
	ED	Exposure duration	yrs	6	EPA, 1991c	2	judgement EPA, 1996a	
	SH	Shielding factor	unitless	0.4	EPA 1996a	0.4		

TABLE 1a
VALUES USED FOR DAILY INTAKE CALCULATIONS
OTTAWA RADIATION AREAS: NPL-1, NPL-4, NPL-8, NPL-9, AND ILLINOIS POWER

Scenario Timeframe:	Current/Future
Medium:	Surface soil
Exposure Medium:	Surface soil
Exposure Point	Surface soil

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Commercial/Industrial Worker								
Ingestion	CS	Chemical concentration in soil	pCi/g or mg/kg	chemical specific	chemical specific	chemical specific	Chemical specific	CDI (pCi) = CS x IR x 1E-03 g/mg/ x EF x ED
	IR-S	Ingestion rate of soil	mg/day	50	EPA 1991c	50	EPA 1991c	
	EF	Exposure frequency	days/yr	250	EPA 1991c	250	EPA 1991c	CDI (mg/kg/d) = CS x IR x 1E-03 g/mg x EF x ED x 1/BW x 1/AT
	ED	Exposure duration	yrs	25	EPA 1991c	9	EPA, 1991c	
	BW	Body weight	kg	70	EPA 1991c	70	EPA, 1997	
	AT-C	Averaging time (cancer)	yrs	25550	EPA 1991c	25550	EPA, 1991c	
	AT-NC	Averaging time (non-cancer)	yrs	9125	EPA 1991c	3285	EPA, 1991c	
Dermal absorption	CS	Chemical concentration in soil	pCi/ or mg/kg	chemical specific	chemical specific	chemical specific	chemical specific	CDI (pCi) = CS x IR x 1E-03 g/mg x EF x ED
	SA	Surface area available for contact	cm2	5800	EPA, 1992a	5000	EPA, 1992a	
	PC	Permeability	cm/hr	0.001 (inorganics): chemical-specific (orgnanics)	EPA, 1997	0.001 (inorganics): chemical-specific (orgnanics)	EPA, 1997	CDI (mg/kg/d) = CS x IR x 1E-03 g/mg x EF x ED x 1/BW x 1/AT
	EF	Exposure frequency	days/yr	250	EPA, 1991c	250	EPA, 1991c	
	ED	Exposure duration	yrs	25	EPA, 1991c	9	EPA, 1997	
	BW	Body weight	kg	70	EPA, 1991c	70	EPA, 1991c	
	AT-C	Average time (cancer)	yrs	25550	EPA, 1991c	25550	EPA, 1991c	
	AT-NC	Averaging time (no-cancer)	yrs	9125	EPA, 1991c	3285	EPA, 1991c	
Inhalation of random outdoors	CS	Chemical concentration in soil	pCi/g or mg/kg	chemical specific	chemical specific	chemical specific	chemical specific	CDI (pCi) = CS x IR x EF x ED x (ET - o x VF - o)
	IR-A	Inhalation rate of air	m3/day	20	EPA, 1991c	13.25	EPA, 1997	
	ET- o	Exposure time fraction - outdoors	unitless	0.02	EPA 1994d	0.02	EPA,1994d	
	EF	Exposure frequency	days/yr	250	EPA, 1991c	250	EPA,1991c	
	ED	Exposure duration	yrs	25	EPA, 1991c	9	EPA,1991c	
	BW	Body weight	kg	70	EPA, 1991c	70	EPA,1991c	
	AT-C	Average time (cancer)	yrs	25550	EPA, 1991c	25550	EPA,1991c	
	AT-NC	Averaging time (no-cancer)	yrs	9125	EPA, 1991c	3285	EPA,1991c	
	VF-o	Volatilization factor for radon - outdoor	pCi/m3/pCi/g	1.20E+002	EPA, 1994d	1.20E+002	EPA,1994d	

TABLE 1a
VALUES USED FOR DAILY INTAKE CALCULATIONS
OTTAWA RADIATION AREAS: NPL-1, NPL-4, NPL-8, NPL-9, AND ILLINOIS POWER

Scenario Timeframe:	Current/Future
Medium:	Surface soil
Exposure Medium:	Surface soil
Exposure Point	Surface soil

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Inhalation of particulates	CS	Chemical concentration in soil	pCi/g or mg/kg	Chemical specific	chemical specific	chemical specific	chemical specific	CDI (mg/kg-d) = CS x IR x 1E+03 g/mg x EF x ED x 1/PEF x 1/B/W x 1/AT
	IR-A	Inhalation rates of air	m3/day	20	EPA, 1991c	13.25	EPA, 1997	
	EF	Exposure frequency	day/yr	250	EPA, 1991c	250	EPA, 1991c	
	ED	Exposure duration	yrs	25	EPA, 1991c	9	EPA, 1997	
	BW	Body weight	kg	70	EPA, 1991c	70	EPA, 1991c	
	AT-C	Average time (cancer)	yrs	25550	EPA, 1991c	25550	EPA, 1991c	
	AT-NC	Average time (non-cancer)	yrs	9125	EPA, 1991c	1.24E+009	EPA, 1991c	
	PEF	Particulate emission factor	yrs	1.24E+009	IEPA, 1997		IEPA, 1997	
External Exposure	CS	Chemical concentration in soil	pCi/g	chemical specific	chemical specific	chemical specific	chemical specific	CDE (pCi) = (CS x ET x EF x ED) x (1-SH) /8760 hr/yr
	ET	Exposure time	hrs/day	8	EPA, 1991c	4	½ workday	
	EF	Exposure frequency	days/yr	250	EPA, 1991c	250	EPA, 1991c	
	ED	Exposure duration	yrs	25	EPA, 1991c	9	EPA, 1997	
	SH	Shielding factor	unitless	0.4	EPA 1996a	0.4	EPA, 1996a	

TABLE 1a
VALUES USED FOR DAILY INTAKE CALCULATIONS
OTTAWA RADIATION AREAS: NPL-1, NPL-4, NPL-8, NPL-9, AND ILLINOIS POWER

Scenario Timeframe:	Current/Future
Medium:	Surface soil
Exposure Medium:	Surface soil
Exposure Point	Surface soil

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/ Reference	CT Value	CT Rationale/ Reference	Intake Equation/ Model Name
Adult Resident								
Ingestion	CW	Chemical concentration in water	pCi/L	chemical specific	chemical specific	chemical specific	chemical specific	CDI (pCi) = CW x IR x 1E-03 m/ug x EF x ED
	IR-W	Inhalation rate of water	L/day	2	EPA, 1991c	1.4	EPA, 1997	CDI (pCi) = CW x IR x 1E-03 m/ug x EF x ED / (BW x AT)
	EF	Exposure frequency	days/yr	350	EPA, 1991c	350	EPA, 1991c	
	ED	Exposure duration	yrs	24	EPA, 1991c	7	Professional judgement	
	BW	Body weight	kg	70	EPA, 1991c	70	EPA, 1991c	
	AT-C	Average time (cancer)	yrs	25550	EPA, 1991c	25550	EPA, 1991c	
	AT-NC	Average time (non-cancer)	yrs	8760	EPA, 1991c	2555	EPA, 1991c	
Ingestion	CW	Chemical concentration in water	pCi/L	chemical specific	chemical specific	chemical specific	chemical specific	CDI (pCi) = CW x IR x 1E-03 m/ug x EF x ED
	IR-W	Inhalation rate of water	L/day	1	EPA, 1991c	0.7	EPA, 1997	CDI (pCi) = x IR x 1E-03 m/ug x EF x ED / (BW x AT)
	EF	Exposure frequency	days/yr	350	EPA, 1991c	350	EPA, 1991c	
	ED	Exposure duration	yrs	6	EPA, 1991c	2	Professional judgement	
	BW	Body weight	kg	15	EPA, 1991c	15	EPA, 1991c	
	AT-C	Average time (cancer)	yrs	25550	EPA, 1991c	25550	EPA, 1991c	
	AT-NC	Average time (non-cancer)	yrs	2190	EPA, 1991c	730	EPA, 1991c	
Commercial/Industrial Worker								
Ingestion	CW	Chemical concentration in water	pCi/L	chemical specific	chemical specific	chemical specific	chemical specific	CDI (pCi) = CW x IR x 1E-03 m/ug x EF x ED
	IR-W	Inhalation rate of water	L/day	1	EPA, 1991c	0.5	Professional judgement	CDI (mg/kg-d) = CW x IR x 1E-03 m/ug x EF x ED / (BW x AT)
	EF	Exposure frequency	days/yr	25	EPA, 1991c	250	EPA, 1991c	
	ED	Exposure duration	yrs	25	EPA, 1991c	9	EPA, 1997	
	BW	Body weight	kg	70	EPA, 1991c	70	EPA, 1991c	
	AT-C	Average time (cancer)	yrs	25550	EPA, 1991c	25550	EPA, 1991c	
	AT-NC	Average time (non-cancer)	yrs	9125	EPA, 1991c	3285	EPA, 1991c	

Table 2
Radionuclide Carcinogenic- -Slope Factors
OTTAWA RADIATION AREAS: NPL-1, NPL-4, NPL-8, NPL-9, AND ILLINOIS POWER
Ottawa, Illinois

Element (Atomic Number)	Isotope a	Radioactive Half-life b	ICRP Lung Class c	GI Absorption Factor(f1) d	Slope Factor Lifetime Excess Total Cancer Risk Per Unit Intake of Exposure		
					Ingestion (Risk/pCi)	Inhalation (Risk/pCi)	External Exposure (Risk/yr per pCi/g soil)
Radium (88)	Ra-226+D	1.600E+03 Y	W	2.0E-001	2.96-010	2.75E-009	6.74E-006
Radon (86)e	Rn-222+D	3.820E+00 D	*	ND	ND	7.57E-012	f

Source: Health Effects Summary Tables - HEAST (U.S. EPA, 1995). U.S. EPA classified all radionuclides as Group A (know human) carcinogens.

a For each radionuclide listed, slope factors correspond to the risk per unit intake or exposure for the radionuclide only, except when marked with a "+D" to indicate that the risks from radioactive decay chain products are also included. Slope factor includes the contribution of short-lived decay products assuming equal activity concentrations (i.e., secular equilibrium) with the principle nuclide in the environment.

b Radioactive half-life: D = day, Y = year. For those radionuclides with decay products (+D), half-lives are listed for the parent radionuclide.

c Lung clearance classification recommended by the International Commission on Radiological Professional (ICRP): Y = year, W = week, * = gas.

d Gastrointestinal (GI) absorption factors are the fractional amounts of each radionuclide absorbed across the GI tract into the bloodstream.

e To derive the inhalation slope factor for Radon-222 and its short-lived progeny, U.S. EPA's Office of Radiation and Indoor Air (ORIA) uses a risk model based on radon decay product exposure and the following exposure assumptions: inhalation rate of 2.2E+04 L/day; 50% equilibrium decay products, and a risk coefficient of 2.36E-04 cases per working level month (WLM).

f External exposure slope factor for radon-222 is included with the radium-226 and its short-lived progeny external slope factor.

ND - Not determined - data is not available, date is inadequate, or is under review.

Table 3

Total Carcinogenic Risk Associated with Radium-226 Exposure
Ottawa Radiation Areas: NPL-1
Ottawa, Illinois

Exposure Route	Total Lifetime Cancer Risk			
	Residential Land Use (adult + child)		Commercial/Industrial Land Use (adult)	
	RME	RAE	RME	RAE
AREA A				
Soil				
Ingestion	1.4E-06	4.3E-07	3.5E-07	1.3E-07
Inhalation of particulates	1.5E-09	2.9E-10	1.0E-09	2.5E-10
External exposure	4.4E-04	8.7E-05	8.7E-05	1.6E-05
Subtotal	4.4E-04	8.7E-05	8.7E-05	1.6E-05
Indoor radon inhalation	2.6E-03	5.2E-04	6.2E-04	1.5E-04
Outdoor radon inhalation	8.9E-05	1.7E-05	5.2E-05	1.3E-05
Subtotal	2.7E-03	5.4E-04	6.7E-04	1.6E-04
Groundwater				
Ingestion	6.8E-05	1.4E-05	2.3E-05	5.7E-06
Sediment				
Ingestion	6.2E-09	4.9E-11	--	--
External Exposure	3.6E-07	5.9E-09	--	--
Subtotal	3.7E-07	5.9E-09	--	--
TOTAL	3E-03	6E-04	8E-04	2E-04
AREA B				
Soil				
Ingestion	4.0E-06	1.2E-06	9.9E-07	3.6E-07
Inhalation of particulates	3.3E-09	8.4E-10	3.0E-09	7.1E-10
External exposure	1.3E-03	2.5E-04	2.5E-04	4.4E-05
Subtotal	1.3E-03	2.5E-04	2.5E-04	4.4E-05
Indoor radon inhalation	9.0E-03	1.8E-03	2.1E-03	5.1E-04
Outdoor radon inhalation	1.6E-04	3.1E-05	9.2E-05	2.2E-05
Subtotal	9.2E-03	1.8E-03	2.2E-03	5.3E-04
Groundwater				
Ingestion	6.8E-05	1.4E-05	2.3E-05	5.7E-06
Sediment				
Ingestion	6.2E-09	4.9E-11	--	--
External exposure	3.6E-07	5.9E-09	--	--
Subtotal	3.7E-07	5.9E-09	--	--
TOTAL	1E-02	2E-03	3E-03	6E-04

Table 3

Total Carcinogenic Risk Associated with Radium-226 Exposure
Ottawa Radiation Areas: NPL-1
Ottawa, Illinois

Exposure Route	**Total Lifetime Cancer Risk**			
	Residential Land Use (adult + child)		**Commercial/Industrial Land Use (adult)**	
	RME	**RAE**	**RME**	**RAE**
AREA C				
Soil				
Ingestion	5.5E-07	1.7E-07	1.4E-07	4.9E-08
Inhalation of particulates	7.0E-10	1.2E-10	4.1E-10	9.8E-11
External exposure	1.7E-04	3.5E-05	3.4E-05	6.1E-06
Subtotal	1.7E-04	3.5E-05	3.4E-05	6.1E-06
Indoor radon inhalation	1.9E-03	3.8E-04	4.6E-04	1.1E-04
Outdoor radon inhalation	3.4E-05	6.6E-06	2.0E-05	4.7E-06
Subtotal	1.9E-03	3.9E-04	4.8E-04	1.1E-04
Groundwater				
Ingestion	6.8E-05	1.4E-05	2.3E-05	5.7E-06
Sediment				
Ingestion	6.2E-09	4.9E-11	--	--
External Exposure	3.6E-07	5.9E-09	--	--
Subtotal	3.7E-07	5.9E-09	--	--
TOTAL	2E-03	4E-04	5E-04	1E-04

--- Not Applicable

Table 4

Total Carcinogenic Risk Associated with Radium-226 Exposure
Ottawa Radiation Areas: NPL-4
Ottawa, Illinois

Exposure Route	Total Lifetime Cancer Risk			
	Residential Land Use (adult + child)		Commercial/Industrial Land Use (adult)	
	RME	RAE	RME	RAE
AREA A				
Soil				
Ingestion	1.7E-06	5.2E-07	4.2E-07	1.5E-07
Inhalation of particulates	1.8E-09	3.6E-10	1.3E-09	3.0E-10
External exposure	5.4E-04	1.1E-04	1.1E-04	1.9E-05
Subtotal	5.4E-04	1.1E-04	1.1E-04	1.9E-05
Indoor radon inhalation	2.4E-01	4.8E-02	3.9E-02	1.4E-02
Outdoor radon inhalation	1.1E-04	2.1E-04	6.4E-05	1.5E-05
Subtotal	2.4E-01	4.8E-02	3.9E-02	1.4E-02
TOTAL	2E-01	5E-02	4E-02	1E-02
AREA B				
Soil				
Ingestion	2.5E-05	7.6E-06	6.2E-06	6.2E-06
Inhalation of particulates	2.7E-08	5.2E-09	1.8E-08	4.4E-09
External exposure	7.7E-03	1.5E-03	1.5E-03	2.8E-04
Subtotal	7.7E-03	1.5E-03	1.5E-03	2.9E-04
Indoor radon inhalation	5.2E-02	1.0E-02	8.4E-03	3.1E-03
Outdoor radon inhalation	1.6E-03	3.1E-04	9.2E-04	2.2E-04
Subtotal	5.4E-02	1.0E-02	9.3E-03	3.2E-03
TOTAL	6E-02	1E-02	1E-02	3E-03

Table 5

Total Carcinogenic Risk Associated with Radium-226 Exposure
Ottawa Radiation Areas: NPL-8
Ottawa, Illinois

Exposure Route	Total Lifetime Cancer Risk			
	Residential Land Use (adult + child)		Commercial/Industrial Land Use (adult)	
	RME	RAE	RME	RAE
Soil				
Ingestion	2.6E-06	8.4E-06	7.5E-07	
Inhalation of particulates	2.7E-09	9.0E-09	2.2E-09	
External exposure	2.6E-04	1.3E-03	4.7E-05	
Subtotal	2.6E-04	1.3E-03	5.0E-05	
Indoor radon inhalation	1.5E-02	4.4E-03	8.6E-03	
Perched water				
Ingestion	7.5E-05	3.6E-04	--	--
Groundwater				
Ingestion	3.2E-06	1.6E-05	--	--
Sediment (Fox River)				
Ingestion	9.2E-10	3.5E-07	--	--
External Exposure	1.0E-07	3.3E-07	--	--
Subtotal	1.0E-07	3.3E-07	--	--
Sediment (O'Neill Branch)				
Ingestion	1.0E-09	3.8E-09	--	--
External Exposure	1.0E-07	3.3E-07	--	--
Subtotal	1.0E-07	3.3E-07	--	--
Sediment (drainage ditch)				
Ingestion	2.6E-09	9.6E-09	--	--
External Exposure	2.6E-07	8.4E-07	--	--
Subtotal	2.6E-07	8.50E-7	--	--
TOTAL	2E-02	6E-03	9E-03	3E-03

---Not Applicable

Table 6

Total Carcinogenic Risk Associated with Radium-226 Exposure
Ottawa Radiation Areas: NPL-9
Ottawa, Illinois

Exposure Route	**Total Lifetime Cancer Risk**			
	Residential Land Use (adult + child)		**Commercial/Industrial Land Use (adult)**	
	RME	**RAE**	**RME**	**RAE**
AREA A				
Soil				
Ingestion	2.7E-06	8.2E-07	6.7E-07	2.4E-07
Inhalation of particulates	2.9E-09	5.7E-10	2.0E-09	4.8E-10
External exposure	8.4E-04	1.7E-04	1.7E-04	3.0E-05
Subtotal	8.4E-04	1.7E-04	1.7E-04	3.0E-05
Indoor radon inhalation	3.9E-03	7.8E-04	6.3E-04	2.3E-04
Outdoor radon inhalation	1.7E-04	3.3E-05	1.0E-04	2.4E-05
Subtotal	4.1E-03	8.1E-04	7.3E-04	2.5E-04
Groundwater				
Ingestion	--	--	--	--
TOTAL	5E-03	1E-03	9E-04	3E-04

---Not Applicable

Table 7

Total Carcinogenic Risk Associated with Radium-226 Exposure
Ottawa Radiation: Illinois Power Site
Ottawa, Illinois

Exposure Route	Total Lifetime Cancer Risk: Commercial/Industrial Land Use (adult)	
	RME	**RAE**
Ingestion	3.4E-07	1.2E-07
Inhalation of particulates	1.0E-09	2.4E-10
External exposure	8.5E-05	1.5E-05
Subtotal	8.5E-05	1.5E-05
Indoor radon inhalation	3.7E-04	1.4E-04
Outdoor radon inhalation	5.1E-05	1.2E-05
Subtotal	4.2E-04	1.5E-04
TOTAL	5E-04	2E-04

TABLE 8

EVALUATION TABLE FOR NPL-1

The Evaluation Table below shows dig the recommended alternative (Alternative 2) would provide the best balance with respect to the nine criteria. U.S. EPA cannot select an alternative unless it is fully protective of human health and the environment and compliant with the applicable or relevant and appropriate requirements.

EVALUATION TABLE		
Evaluation Criteria	**Alternative 1**	**Alternative 2***
1. Overall Protection of Human Health & Environment	9	•
2. Compliance with ARARs	9	•
3. Long-term Effectiveness and Permanence	9	•
4. Reduction of Toxicity, Mobility, or Volume Through Treatment	9	9
5. Short-term Effectiveness	9	•
6. Implementability	•	•
7. Cost (Estimated)	**$0**	**$1,030,000**
8. Support Agency Acceptance	**State Agency acceptance of the recommended alternative will be evaluated after the public comment period**	
9. Community Acceptance	**Community acceptance of the recommended alternative will be evaluated after the public comment period**	
• - Fully meets criteria 3 - Partially meets criteria 9 - Does not meet criteria		

* U.S. EPA recommended alternative

TABLE 9

EVALUATION TABLE FOR NPL-4

The Evaluation Table below shows that Alternatives 2 and 3 would provide the best balance with respect to the nine criteria. Even though initial costs are greater for Alternative 3, U.S. EPA believes that the addition of volume reduction methodologies in Alternative 3 could provide significant cost savings and is recommending this Alternative. U.S. EPA cannot select an alternative unless it is fully protective of human health and the environment and compliant with the applicable or relevant and appropriate requirements.

EVALUATION TABLE				
Evaluation Criteria		**Alternative 1**	**Alternative 2**	**Alternative 3***
1.	**Overall Protection of Human Health & Environment**	**9**	•	•
2.	**Compliance with ARARs**	**9**	•	•
3.	**Long-term Effectiveness and Permanence**	**9**	•	•
4.	**Reduction of Toxicity, Mobility, or Volume Through Treatment**	**9**	**9**	**9**
5.	**Short-term Effectiveness**	**9**	•	•
6.	**Implementability**	•	•	•
7.	**Cost (Estimated)**	**$0**	**$8,050,000**	**$9,700,000**
8.	**Support Agency Acceptance**	**State Agency acceptance of the recommended alternative will be evaluated after the public comment period**		
9.	**Community Acceptance**	**Community acceptance of the recommended alternative will be evaluated after the public comment period**		
• -Fully meets criteria	**3** - Partially meets criteria	**9** - Does not meet criteria		

r U.S. EPA recommended alternative

TABLE 10

EVALUATION TABLE FOR NPL-8

When looking at the Alternatives for NPL-8, future recreational land use at the site played a key role in the U.S. EPA's decision for a proposed remedy. Taking this into account and examining the best balance with respect to the nine criteria, U.S. EPA is recommending Alternative 6. U.S. EPA cannot select an alternative unless it is fully protective of human health and the environment and compliant with the applicable or relevant and appropriate requirements.

EVALUATION TABLE						
Evaluation Criteria	**Alternative 1**	**Alternative 2**	**Alternative 3**	**Alternative 4**	**Alternative 5**	**Alternative 6***
1. Overall Protection of Human Health & Environment	9	•	•	•	•	•
2. Compliance with ARARs	9	•	•	•	•	•
3. Long-term Effectiveness and Permanence	9	3	3	•	3	3
4. Reduction of Toxicity, Mobility, or Volume Through Treatment	9	9	9	9	9	9
5. Short-term Effectiveness	9	•	•	•	•	•
6. Implementability	•	•	•	•	•	•
7. Cost (Estimated)	**$0**	**$6,280,000**	**$5,700,000**	**$43,020,000**	**$21,080,000**	**$32,970,000**
8. Support Agency Acceptance	**State acceptance of the recommended alternative will be evaluated after the public comment period**					
9. Community Acceptance	**Community acceptance of the recommended alternative will be evaluated after the public comment period**					
• - Fully meets criteria 3 - Partially meets criteria 9 - Does not meet criteria						

* U.S. EPA recommended alternative

TABLE 11

EVALUATION TABLE FOR NPL-9

The Evaluation Table below shows that the recommended alternative (Alternative 2) would provide the best balance with respect to the nine criteria. U.S. EPA cannot select an alternative unless it is fully protective of human health and the environment and compliant with the applicable or relevant and appropriate requirements.

EVALUATION TABLE		
Evaluation Criteria	**Alternative 1**	**Alternative 2***
1. Overall Protection of Human Health & Environment	9	•
2. Compliance with ARARs	9	•
3. Long-term Effectiveness and Permanence	9	•
4. Reduction of Toxicity, Mobility, or Volume Through Treatment	9	9
5. Short-term Effectiveness	9	•
6. Implementability	•	•
7. Cost (Estimated)	**$0**	**$600,000**
8. Support Agency Acceptance	**State Agency acceptance of the recommended alternative will be evaluated after the public comment period**	
9. Community Acceptance	**Community acceptance of the recommended alternative will be evaluated after the public comment period**	
• - Fully meets criteria 3 - Partially meets criteria 9 - Does not meet criteria		

r U.S. EPA recommended alternative

Table 12
NPL-1 (ALTERNATIVE 2)
Ottawa Radiation Areas
Ottawa, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
DIRECT COSTS						
MOBILIZATION/DEMOBILIZATION	Job	EST	$35,000	$35,000		Includes mobilization of equipment, utilities, and controls.
					$35,000	
SITE PREPARATION						
Clearing and Grubbing	3	Acre	$10,000	$31,000		
Access Improvements	Job	EST	$10,000	$10,000		
Temporary Facilities	15	WK	$1,500	$22,500		
					$63,500	
EXCAVATION						
Area A - Overburden Material	488	CY	$5	$2,442		In situ volume. Includes 10% over-excavation factor.
Area A - Radium-contaminated Soil	611	CY	$5	$3,053		In situ volume. Includes 10% over-excavation factor.
Area B - Overburden Material	292	CY	$5	$1,458		In situ volume. Includes 10% over-excavation factor.
Area B - Radium-contaminated Soil	292	CY	$5	$1,458		
					$8,410	
ON-SITE LABORATORY	6	weeks	$7,500	$45,000		Assumes no perched water will be encountered during excavation activities.
					$45,000	
PERCHED WATER MANAGEMENT	0	GAL	$0	$0		Assumes no perched water will be encountered during excavation activities
					$0	
OFF-SITE DISPOSAL						
Area A - Radium-contaminated Soil	733	CY	$230	$168,498		Assumes disposal in a radioactive waste landfill. Assumes 20% swell factor. Includes transportat
Area B - Overburden Material (Special Waste)	350	CY	$38	$13,292		Assumes disposal in a special waste landfill. Assumes 20% swell factor Includes transportation.
Area B - Radium-contaminated Soil	350	CY	$230	$80,454		Assumes disposal in a radioactive waste landfill. Assumes 20% swell factor. Includes transportat
					$262,244	
SITE RESTORATION						
Backfill - Area A	611	CY	$15	$9,158		Assumes borrow source is within 5 miles of the site. No compaction factor applied.
Backfill - Area B	583	CY	$15	$8,745		Assumes borrow source is within 5 miles of the site. No compaction factor applied.
Regevegetation	1	Acre	$5,000	$5,00		
					$22,903	
DIRECT COST SUBTOTAL					$437,056	
INDIRECT COSTS						
ENGINEERING/DESIGN/INVESTIGATION						
Engineering, Design and Permitting (@ 1% of direct costs)	-	-	-	$43,700		
					$43,700	
CONTRACTOR PROCUREMENTS (@ 1% of direct costs)	-	-	-	$4,400		
					$4,400	
CONSTRUCTION MANAGEMENT						
Resident Engineer	300	HR	$75	$22,500		One engineers for 6 weeks @ 50 hr/wk.
Health & Safety Monitoring	300	HR	$75	$22,500		One health physicist for 6 weeks @ 50 hr/wk.
Per Diem (Engineer & Health Physicist)	60	DAY	$74	$4,440		
Car Rental	30	DAY	$50	$1,500		
Admin/Office Support (@ 10% of construction management labor)	-	-	-	$2,250		
Surveying	Job	EST	$50, 000	$50,000		
QA/QC Testing	3	Acre	$10,000	$30,000		
Post-Construction Documentation and Certification	Job	EST	$150,000	$150,00		
Site Security	6	WK	$2,000	$12,000		
					$295,190	
INDIRECT COST SUBTOTAL					$343,290	
ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS						
O&M COST SUBTOTAL					$0	
FIVE-YEAR-REVIEW COSTS						
FIVE YEAR REVIEW	1	5-YEAR	$20,000	$20,000		
					$20,000	
FIVE-YEAR REVIEW COST SUBTOTAL					$20,000	
SUB-TOTAL of DIRECT AND INDIRECT COSTS					$780,346	
SUB-TOTAL of DIRECT AND INDIRECT COSTS WITH 25% CONTINGENCY					$975,000	
SUB-TOTAL of ANNUAL O&M COSTS					$0	
SUB-TOTAL of FIVE YEAR REVIEW COSTS					$20,000	
SUB-TOTAL of O&M COSTS WITH 25% CONTINGENCY					$0	
SUB-TOTAL of FIVE YEAR REVIEW COSTS WITH 25% CONTINGENCY					$25,000	
PRESENT WORTH OF O&M COSTS WITH CONTINGENCY					$0	Assumes an interest factor of 7% and an O&M period of 30 years.
PRESENT WORTH OF FIVE YEAR REVIEW COSTS WITH CONTINGENCY					$54,000	Assumes an interest factor of 7% and an O&M period of 30 years.
TOTAL (DIRECT COSTS + INDIRECT COSTS + PRESENT WORTH O&M COSTS + FIVE-YEAR REVIEW COSTS) WITH CONTINGENCY					$1,030,000	

TABLE 13
ALTERNATIVE 3
Soil Excavation, Perched Water Collection, Volume Reduction, and Off-Site Disposal
NPL-4 Site
Ottawa, Illinois

	Quantity	Unit	Unit Price	Cost	Subtotal	COMMENTS
DIRECT COSTS						
MOBILIZATION/DEMOBILIZATION	1	Lump Sum	$375,000	$375,000		Includes segmented gate system. Includes 70-ton crane rental and operator.
					$375,000	
SITE PREPARATION						
Clearing and Grubbing	4.3	Acre	$10,000	$43,000		
Access Improvements	1	Lump Sum	$100,000	$100,000		
Temporary Facilities	22	WK	$1,500	$33,000		
					$176,000	
EXCAVATION	17,880	CY	$5	$89,400		In situ volume. Includes 20% over-excavation factor.
					$89,400	
WASTE PILE AREA						
Waste Pile Area	20,000	SF	$6	$120,000		
Pre-fabricated Building	1	Lump Sum	$175,000	$175,000		
					$295,000	
ON-SITE LABORATORY	22	weeks	7500	$165,000		
					$165,000	
SEGMENTED GATES	21,456	CY	$75	$1,609,200		Assumes 20% swell factor. (17,880 cy [in situ] radium-contaminated soil is processed)
					$1,609,200	
OFF-SITE DISPOSAL						
Radioactive Waste Landfill	17,165	CY	$230	$3,947,904		Assumes 20% swell factor and 20% volume reduction by segmented gates. Includes transportation.
Special Waste Landfill	4,291	CY	$38	$163,066		Assumes 20% swell factor. Includes trans. Assumes soil processed through segmented gates below ra-226 standard requires disposal as special waste due to metals.
					$4,110,970	
PERCHED WATER MANAGEMENT	76,000	GAL	$0.30	$22,800		Accounts for perched water in soil excavated from below perched water table.
					$22,800	
SITE RESTORATION						
Backfill	17,880	CY	$13	$232,440		Assumes borrow source is within 5 miles of the site. No compaction factor applied.
Revegetation	4.3	Acre	$5,000	$21,500		
					$253,940	
DIRECT COST SUBTOTAL					$7,097,310	
INDIRECT COSTS						
ENGINEERING/DESIGN/INVESTIGATION						
Engineering and Design	1	Lump Sum	$100,000	$100,000		
					$100,000	
CONTRACTOR PROCUREMENTS (@ 1% of direct costs)	-	-	-	$71,000		
					$71,000	
CONSTRUCTION MANAGEMENT						
Resident Engineer	2,200	HR	$75	$165,000		Two engineers for 22 weeks @ 50 hr/wk.
Health & Safety Monitoring	1,100	HR	$75	$82,500		One health physicist for 22 weeks @ 50 hr/wk.
Per Diem (Engineer and 1 Health Physicist)	330	DAY	$74	$24,420		
Car Rental	110	DAY	$50	$5,500		
Admin/Office Support @ 10% of construction management	-	-	-	$16,500		
Surveying	1	Lump Sum	$50,000	$50,000		
Post-Construction Documentation and Certification	1	Lump Sum	$100,000	$100,000		
Site Security	22	WK	$2,000	$44,000		
					$487,920	
INDIRECT COST SUBTOTAL					$658,920	
ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS						
ANNUAL O&M COST SUBTOTAL					$0	
SUB-TOTAL of DIRECT AND INDIRECT COSTS					$7,756,230	
SUB-TOTAL of DIRECT AND INDIRECT COSTS WITH 25% CONTINGENCY					$9,695,000	
SUB-TOTAL of ANNUAL O&M COSTS					$0	
SUB-TOTAL of O&M COSTS WITH 25% CONTINGENCY					$0	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$0	Assumes an interest factor of 7% and an O&M period of 30 years.
TOTAL (DIRECT COSTS +INDIRECT COSTS + PRESENT WORTH O&M COST +FIVE-YEAR REVIEW COSTS) WITH CONTINGENCY					$9,700,000	

Table 14
NPL-8 COST ESTIMATES (ALTERNATIVE 6)
Ottawa Radiation Areas
Ottawa, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
DIRECT COSTS						
MOBILIZATION/DEMOBILIZATION	Job	EST	$200,000	$200,000		
					$200,000	
SITE PREPARATION						
Clearing and Grubbing	38	Acre	$10,000	$380,000		
Off-site Disposal of Concrete Debris	5,000	CY	$60	$300,000		
Access Improvements	Job	EST	$100,000	$100,000		
Temporary Facilities	39	WK	$1,500	$58,500		
					$838,500	
EXCAVATION	76,000	CY	$5	$380,000		
					$380,000	
WASTE PILE AREA						
Waste Pile Area	75,000	SF	$5	$375,000		
Pre-fabricated Building	1	Estimate	$325,000	$325,000		
					$700,000	
SEGMENTED GATES	91,200	CY	$75	$6,840,000		Assumes 20 % swell factor
					$6,840,000	
OFF-SITE DISPOSAL						
Radioactive Waste Landfill	54,600	CY	$150	$8,162,700		Assumes 20 % swell factor
Special Waste Landfill	36,000	CY	$36	$1,390,800		Assumes 20 % swell factor. Includes transportation.
					$9,553,500	
TRANSPORTATION COSTS						
Local Transportation from the Site to the Railroad Siding	54,600	CY	$4	$191,100		Assumes 5000 trips by a 14 CY dump truck @ $48.00 per trip.
Transportation from the Railroad Siding to the Site	54,600	CY	$73	$3,985,800		Assumes 59 trips by a train hauling eighty 14 CY intermodals.
Intermodal Rentals	140	DAY	$1,313	$183,750		Assumes an intermodal rental rate of $12.50 per day. Assumes 106 intermodals
					$4,360,650	
SITE RESTORATION						
Top Soil Layer	19,000	CY	$15	$285,000		Includes equipment and labor
Backfill	76,000	CY	$13	$988,000		
Revegetation	18	Acre	$5,000	$90,000		
					$1,363,000	
DIRECT COST SUBTOTAL					$23,395,650	
INDIRECT COSTS						
ENGINEERING/DESIGN/INVESTIGATION						
Engineering and Design	Job	EST	$325,000	$325,000		
					$325,000	
CONTRACTOR PROCUREMENTS (@ 1% of direct costs)				$236,400		
					$236,400	
CONSTRUCTION MANAGEMENT						
Resident Engineer	3,900	HR	$75	$292,500		Two engineers for 39 weeks @ 50 hr/wk.
Per Diem (Engineer)	390	DAY	$74	$28,860		
Car Rental	195	DAY	$50	$9,750		
Admin/Office Support (@ 10% of construction management labor)				$29,250		
Surveying	Job	EST	$50,000	$50,000		
Health & Safety Monitoring	1,950	HR	$75	$146,250		One health physicist for 39 weeks @ 50 hr/wk
Post-Construction Documentation and Certification	Job	EST	$100,000	$100,000		
Site Security	39	WK	$2,000	$78,000		
					$734,610	
INDIRECT COST SUBTOTAL					$1,000,000	
ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS						
ANNUAL O&M						
ANNUAL GROUNDWATER MONITORING						
ANALYTICAL COSTS						
Semivolatiles	20	Samples	$300	$6,000		16 monitoring wells. Samples include QA/QC samples. Assumes 1 sampling round per year.
Metals	20	Samples	$200	$4,000		16 monitoring wells. Samples include QA/QC samples. Assumes 1 sampling round per year
Radium-226	20	Samples	$400	$8,000		16 monitoring wells. Samples include QA/QC samples. Assumes 1 sampling round per year
				$18,000		
SAMPLING LABOR AND SUPPLIES						
Engineer	30	HR	$75	$2,250		10 hr/day, 3 days for sampling. Assumes 1 sampling round per year
Per Diem	3	DAY	$74	$222		
Geologist	30	HR	$75	$2,250		
Per Diem	3	DAY	$74	$222		
Car Rental	3	DAY	$50	$150		
Shipping	3	CLR	$72	$216		
Equipment/Supplies	Job	EST	[illegible]	$800		
				$6,110		
					$24,110	
ANNUAL O&M COST SUBTOTAL					$24,110	
FIVE YEAR REVIEW	1	5-YEAR	$20,000	$20,000		
					$20,000	
FIVE-YEAR REVIEW COST SUBTOTAL					$20,000	
SUB-TOTAL of DIRECT AND INDIRECT COSTS					$26,661,670	
SUB-TOTAL of DIRECT AND INDIRECT COSTS WITH 25% CONTINGENCY					$32,340,000	
SUB-TOTAL of ANNUAL O&M COSTS					$24,130	
SUB-TOTAL of FIVE-YEAR REVIEW COSTS					$20,000	
SUB-TOTAL of ANNUAL O&M COSTS WITH 25% CONTINGENCY					$30,162	
SUB-TOTAL of FIVE-YEAR REVIEW COSTS WITH 25% CONTINGENCY					$25,000	
PRESENT WORTH of ANNUAL O&M COSTS WITH CONTINGENCY					$374,000	Assumes an interest factor of 7 % and an O&M period of 30 years.
PRESENT WORTH of FIVE-YEAR REVIEW COSTS WITH CONTINGENCY					$63,946	Assumes an interest factor of 7 % and 6 five year review periods.
TOTAL COST (DIRECT COSTS + INDIRECT COSTS + PRESENT WORTH COSTS) WITH CONTINGENCY					$32,970,000	

Table 15
NPL COST ESTIMATE (ALTERNATIVE 2)
Ottawa Radiation Areas
Ottawa, Illinois

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
DIRECT COSTS						
MOBILIZATION/DEMOBILIZATION	1	Lump Sum	$35,000	$35,000		Includes mobilization of equipment, utilities, and controls.
					$35,000	
SITE PREPARATION						
Clearing and Grubbing	1	Acre	$10,000	$6,000		
Access Improvements	1	Lump Sum	$10,000	$10,000		
Temporary Facilities	6	WK	$1,500	$9,000		
					$25,000	
EXCAVATION						
Radium-226 Contaminated Soil	418	CY	$5	$2,090		In situ volume. Includes 10% over-excavation factor.
Overburden Soil	1,595	CY	$5	$7,975		In situ volume. Includes 10% over-excavation factor.
					$10,065	
ON-SITE LABORATORY	6	weeks	$7,500	$45,000		
					$45,000	
OFF-SITE DISPOSAL						
Radioactive Waste Landfill	502	CY	$230	$115,368		Assumes 20% swell factor. Includes transportation.
Special Waste Landfill	1,914	CY	$38	$72,732		Assumes 20% swell factor. Includes transportation.
					$188,100	
SITE RESTORATION						
Backfill	2,013	CY	$15	$30,195		Assumes borrow source is within 5 miles of the site. No compaction factor applied.
Regevegtation	1.0	Acre	$5,000	$5,000		
					$35,195	
DIRECT COST SUBTOTAL					$338,360	
INDIRECT COSTS						
ENGINEERING/DESIGN/INVESTIGATION						
Engineering, Design and Permitting @ 1% of dir	-	-	-	$33,800		
					$33,800	
CONTRACTOR PROCUREMENTS (@ 1% of direct costs)	-	-	-	$3,400		
					$3,400	
CONSTRUCTION MANAGEMENT						
Resident Engineer	300	HR	$75	$22,500		One engineer for 6 weeks @ 50 hr/wk
Health & Safety Monitoring	300	HR	$75	$22,500		One health physicist for 6 weeks @ 50 hr/wk.
Per Diem (Engineer & Health Physicist)	60	DAY	$74	$4,440		
Car Rental	30	DAY	$50	$1,500		
Admin/Office Support (@ 10% of construction management labor)	-	-	-	$2,250		
Surveying	1	Lump Sum	$10,000	$10,000		
QA/QC Testing	1	Acre	$10,000	$10,000		
Post-Construction Documentation and Certification	1	Lump Sum	$25,000	$25,000		
Site Security	6	WK	$500	$3,000		
					$101,190	
INDIRECT COST SUBTOTAL					$138,390	
ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS						
O&M COST SUBTOTAL					$0	
SUB-TOTAL of DIRECT AND INDIRECT COSTS					$476,750	
SUB-TOTAL of DIRECT AND INDIRECT COSTS WITH 25% CONTINGENCY					$596,000	
SUB-TOTAL of ANNUAL O&M COSTS					$0	
SUB-TOTAL of O&M COSTS WITH 25% CONTINGENCY					$0	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$0	Assumes an interest factor of 7% and an O&M period of 30 years.
TOTAL (DIRECT COSTS +INDIRECT COSTS + PRESENT WORTH O&M COST +FIVE-YEAR REVIEW COSTS) WITH CONTINGE					**$600,000**	

Table 16
Illinois Power
Ottawa Radiation Areas

	ENGINEER'S ESTIMATES					COMMENTS
	Quantity	Unit	Unit Price	Cost	Subtotal	
DIRECT COSTS						
MOBILIZATION/DEMOBILIZATION	1	Lump Sum	$2,000	$2,000		Includes mobilization of equipment, utilities, and controls.
					$2,000	
EXCAVATION						
Radium-226 Contaminated Soil	1	Lump Sum	$1,000	$1,000		In situ volume.
					$1,000	
OFF-SITE DISPOSAL						
Radioactive Waste Landfill	24	CY	$150	$3,600		Assumes 20% swell factor.
Transportation	1,500	CY	$4	$6,000		Assumes 24 cy of contaminated soil, a 40 cubic yard container, $4.00 / loaded mile, and 1500 miles from the site to the disposal facility.
					$9,600	
SITE RESTORATION						
Replacement of Concrete Pad	1	Lump Sum	$3,000	$3,000		
Backfill	1	Lump Sum	$800	$800		Assumes borrow source is within 5 miles of the site. No compaction factor applied.
Regevegetation	1	Lump Sum	$500	$500		
					$4,300	
DIRECT COST SUBTOTAL					$16,900	
INDIRECT COSTS						
ENGINEERING/DESIGN/INVESTIGATION						
Engineering, Design and Permitting	1	Lump Sum	$3,000	$3,000		
					$3,000	
CONTRACTOR PROCUREMENTS (@ 5% of direct costs)	-	-	-	$800		
					$800	
CONSTRUCTION MANAGEMENT						
Resident Engineer	32	HR	$75	$2,400		One engineer for 4 days @ 8 hr/day.
Per Diem (Engineer)	4	DAY	$74	$296		
Car Rental	4	DAY	$50	$200		
Admin/Office Support @ 10% of construction management labor)	-	-	-	$240		
Surveying	1	Lump Sum	$2,000	$2,000		
QA/QC Testing	1	Lump Sum	$2,000	$2,000		
Health & Safety Monitoring	16	HR	$75	$1,200		One health physicist for two 8-hr days.
Post-Construction Documentation and Certification	1	Lump Sum	$3,000	$3,000		
					$11,336	
INDIRECT COST SUBTOTAL					$15,136	
ANNUAL OPERATIONS AND MAINTENANCE (O&M) COSTS						
O&M COST SUBTOTAL					$0	
SUB-TOTAL of DIRECT AND INDIRECT COSTS					$32,036	
SUB-TOTAL of DIRECT AND INDIRECT COSTS WITH 25% CONTINGENCY					$40,000	
SUB-TOTAL of ANNUAL O&M COSTS					$0	
SUB-TOTAL of O&M COSTS WITH 25% CONTINGENCY					$0	
PRESENT WORTH of O&M COSTS WITH CONTINGENCY					$0	Assumes an interest factor of 7% and an O&M period of 30 years.
TOTAL (DIRECT COSTS +INDIRECT COSTS + PRESENT WORTH O&M COST +FIVE-YEAR REVIEW COSTS) WITH CONTINGENCY					$40,000	

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
POTENTIAL FEDERAL CHEMICAL-SPECIFIC ARARS					
Clean Air Act (42 USC 7401-7462)					
National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50)	Establishes primary and secondary standards for ambient air quality to protect public health and welfare.	Y	Y	Y	Y
National Emissions Standards for Hazardous Air Pollutants (NESHAPS) (40 CFR Part 61)	Establishes emissions standards for those hazardous air pollutants for which no ambient air quality standards exists, but which cause, or contribute to, air pollution that may result in an increase in morality or an increase in serious irreversible or incapacitating reversible illness.	Y	Y	Y	Y
National Emission Standards for Radon Emissions from Department of Energy (DOE) Facilities (40 CFR Part 61, Subpart A)	Standards for emissions of radium-containing materials from storage and disposal facilities.	Y	Y	Y	Y
Clean Water Act (33 USC Sect. 1251-1376)					
Water Quality criteria (40 CFR Part 131 Quality Criteria for Water, 1976, 1980, 1986)	Sets criteria for water quality based on toxicity to aquatic organisms and human health.	Y	Y	Y	Y
Safe Drinking Water Act (40 USC Sect. 300)					
National Primary Drinking Water Standards (40 CFR Part 141)	Establishes health-based standards for public water systems (maximum-contaminant levels).	Y	Y	Y	Y
National Secondary Drinking Water Standards (40 CFR Part 143)	Establishes welfare-based standards for public water systems (secondary maximum contaminant levels).	Y	Y	Y	Y
Maximum Contaminant Level Goals (40 CFR 141.50, 141.51, 141.52)	Establishes drinking water quality goals set at levels of no known or anticipated adverse health effects, with an adequate margin of safety.	Y	Y	Y	Y

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
Environmental Radiation Protection Standards for Nuclear Power Operations					
40 CFR Part 190	Set limits on radiation doses received by members of the general public within the uranium fuel cycle.	Y	Y	Y	Y
Resource Conservation and Recovery Act (as amended by HSWA) (40 USC 6901)					
Releases from Solid Waste Management Units (SWMUs) (40 CFR 264.94 through 264.99)	These regulations establish groundwater protection standards and groundwater monitoring requirements for on-site SWMUs.	Y	Y	Y	Y
Identification and Listing of Hazardous Waste (40 CFR Part 261)	Defines those solid wastes which are subject to regulation as hazardous waste under 40 CFR Parts 262-265 and Parts 124, 270, and 271.	Y	Y	Y	Y
U.S. EPA Effluent Guidelines and Standards					
Discharge of Radioactive Pollutants to Surface Waters (40 CFR Part 440)	Established radionuclide concentration limits for liquid effluents from facilities that extract and process uranium, radium, and vanadium ores.	NA	NA	NA	NA
Uranium Mill Tailings Radiation Control Act (42 USC 2022, 7901-7942)					
Standards for the Stabilization, disposal, and Control of Uranium and Thorium Mill Tailings (40 CFR Part 192)	Establishes health-based standards for control of residual radioactive materials from inactive uranium processing sites and standards for cleanup of lands and buildings having radioactive materials from inactive uranium processing sites.	Y	Y	Y	Y

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
To Be Considered (TBCs) Standards					
Department of Energy (DOE) Order 5400.5, entitled “Radiation Protection of the Public and the Environment”	This order establishes standards and requirements for DOE operations with respect to protection of members of the public against radiation and contains a discussion of DOE’s as low as reasonably achievable (ALARA) approach.	Y	Y	N	Y
Standards for Protection Against Radiation (10 CFR 20)	Regulations contain the Nuclear Regulatory Commission Standards for protection against radiation, and contain an “ALARA” approach.	Y	Y	Y	Y
POTENTIAL FEDERAL LOCATION-SPECIFIC ARARS					
Endangered Species Act of 1973 (16 USC 1531 et seq.)	Establishes requirements to protect species threatened by extinction and habitats critical to their survival.	NA	NA	NA	NA
National Historic Preservation Act of 1966 (UST 470 et seq.)	Establishes requirements to protect historically significant facilities.	NA	NA	NA	NA
Executive Order 11988, Floodplain Management (40 CFR Part 6, Appendix A)	Establishes agency policy and guidance for carrying out the provisions of Executive Orders 11988 “Floodplain Management.”	Y	Y	Y	Y
Executive Order 11990, Protection of Wetlands (40 CFR Part 6, Appendix A)	Requires minimization of destruction, loss, or degradation of wetlands.	NA	NA	NA	NA
Fish and Wildlife Coordination Act (16 USC 661-666 40 CFR 6.302[g])	Requires consultation when a federal department or agency proposes or authorizes any modification of any stream or other water body; requires adequate provisions for protection of fish and wildlife resources. It also establishes policy for Executive Order 11900, “Protection of Wetlands.”	Y	Y	Y	Y

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
POTENTIAL FEDERAL LOCATION-SPECIFIC ARARS					
Discharges of Dredged or Fill Material into Waters of the United States (33 CFR Part 323)	Established permit requirements for actions that involve dredging or filling in of a navigable waterway or wetland.	Y	Y	Y	Y
To Be Considered (TBC) Standards					
The Native American Grave Protection and Repatriation Act (NAGPRA). Public Law 101-601 (Nov. 16, 1990).	Law provides for protection of Native American graves, and for other selected purposes.	Y	Y	Y	NA
The Migratory Bird Treaty Act (16 USC 703)	Law makes it unlawful to take, kill, or possess any migratory bird, any part, nest, or eggs of any such bird.	Y	Y	Y	NA
The archaeological Resources Protection Act of 1979. Public Law 96-95.	Provides for the protection of archaeological resources on federal and Indian lands.	Y	Y	Y	NA
POTENTIAL FEDERAL ACTION-SPECIFIC ARARS					
Occupational Safety and Health Administration (OSHA) Regulations (29 USC 651)					
29 CFR 1910.120	Establishes limits for worker exposures during response actions at CERCLA sites.	Y	Y	Y	Y
29 CFR Part 1926	Establishes construction standards	Y	Y	Y	Y

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
Army Corp of Engineers Program					
Discharges of Dredged or Fill Materials into Waters of the United States (33 CFR Part 323)	Establishes requirements for actions that involve dredging or filling in of a navigable waterway or wetland.	Y	Y	Y	Y
Clean Air Act					
National Primary and Secondary Ambient Air Quality Standards (40 CFR Part 50)	Establishes standards for ambient air quality to protect public health and welfare (including standards for particulate matter and lead).	Y	Y	Y	Y
Section 101	Calls for development and implementation of regional air pollution control programs.	Y	Y	Y	Y
U.S. EPA Regulation on National Emission Standards for Hazardous Air Pollutants					
40 CFR Part 52	Requires the filing of a notice with the state regarding intent to install a new stationary source of air pollution.	Y	Y	Y	Y
U.S. EPA Regulation on National Emission Standards for Hazardous Air Pollutants.					
40 CFR Part 61	Regulates emissions of hazardous air pollutants.	Y	Y	Y	Y
Federal Water Pollution Control Act as Amended by the Clean Water Act of 1977					
Section 208(b)	The proposed action must be consistent with regional water quality management plans as developed under Section 208 of the Clean Water Act.	Y	Y	Y	Y

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
U.S. EPA National Pollutant Discharge Elimination System (NPDES) Permit Regulations					
40 CFR 122.21	Permit application must include a detailed description of the proposed action including a listing of all required environmental permits.	NA	NA	NA	NA
40 CFR 122.44	Federally approved state water quality standards. These may be in addition to or more stringent than federal water quality standards.	NA	NA	NA	NA
40 CFR 122.44(a)	Requires the use of the Best Available Technology (BAT) for toxic and non-conventional wastewaters or the Best Conventional Technology (BCT) for conventional pollutants.	NA	NA	NA	NA
40 CFR 122.44(e)	Discharge limits must be established for toxics to be discharged at concentrations exceeding levels achievable by the technology-based (BAT/BCT) standards.	NA	NA	NA	NA
40 CFR 122.44(1)	Requires monitoring of discharges to ensure compliance. Monitoring programs shall include data on the mass, volume and frequency of all discharge events.	NA	NA	NA	NA
40 CFR 125.100	The site operator shall develop a best management practice (BMP) program and shall incorporate it into the operations plan or the NPDES permit application if required.	NA	NA	NA	NA
Clean Water Act (33 USC Sect. 1251-1376)					
40 CFR Part 131	States are granted enforcement jurisdiction over direct discharges and may adopt reasonable standards to protect or enhance the uses and qualities of surface water bodies in the states.	NA	NA	NA	NA

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
U.S. EPA Regulations on Test Procedures for the Analysis of [Water] Pollutants					
40 CFR 136.1-136.4	These sections require adherence to sample preservation procedures including container materials and sample holding times.	Y	Y	Y	Y
Resource Conservation and Recovery Act (RCRA) (42 USC 6901)					
40 CFR Part 261	Identifies those wastes subject to regulation as hazardous wastes.	Y	Y	Y	Y
Transportation of Hazardous Waste (40 CFR Part 263)	Requires that transporters must be licensed hazardous waste haulers. In the event of a discharge during transportation, the transporter must take immediate action to protect human health and the environment and cleanup the discharge such that it no longer presents a hazard.	NA	Y	Y	NA
Releases from Solid Waste Management Units (SWMUs) (40 CFR 264.91 through 264.99)	These regulations establish groundwater protection standards and groundwater monitoring requirements for on-site SWMUs.	Y	Y	Y	Y
Containers (40 CFR 264.171 through 264.178)	Regulations cited under 40 CFR 264.171 to 264.178 (Subpart I) concern permanent on-site storage of hazardous wastes or temporary storage phases used during various cleanup actions such as removal or incineration.	Y	Y	Y	Y

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
Resource Conservation and Recovery Act (RCRA) (42 USC 6901) (Continued)					
Tanks (40 CFR 264.191 through 264.198)	Regulations under 40 CFR 264.191 to 264.198 (Subpart J) apply to tank storage of hazardous materials.	Y	Y	NA	NA
Waste Piles (40 CFR 264.251 through 264.256)	Establishes minimum technology requirements for waste piles that would be used to place RCRA hazardous waste.	Y	Y	Y	Y
Miscellaneous Treatment Units (40 CFR Part 264 Subpart X)	Standards for environmental performance of miscellaneous treatment units.	NA	Y	NA	NA
40 CFR Part 265	Regulations for interim hazardous waste facilities in operation both before and after November 19, 1980.	NA	Y	Y	Y
Land Disposal Restrictions (LDRs) (40 CFR Part 268)	Requires any waste placed in land-disposal units to comply with LDRs by either attaining specific performance-or technology-based standards.	NA	Y	Y	
U.S. EPA Effluent Guidelines and Standards					
40 CFR 403.5	If wastes are discharged to a publicly owned treatment works facility (POTW) the treatment process must not allow waste to pass through untreated or result in contaminated sewage sludge.	NA	NA	NA	NA
40 CFR Part 440	Establishes radionuclide concentration limits for liquid effluent from facilities that extract and process uranium, radium, and vanadium ores.	NA	NA	NA	NA

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
Uranium Mill Tailings Radiation Control Act (42 USC 7401-7462)					
Standards for the Stabilization, Disposal, and Control of Uranium and Thorium Mill Tailings (40 CFR Part 192)	Establishes health-based standards for control of residual radioactive materials from inactive uranium processing sites and standards for cleanup of lands and buildings having radioactive materials from inactive uranium processing sites.	Y	Y	Y	Y
U.S. Department of Transportation (DOT) Regulations					
40 CFR Parts 170 through 179	Establishes requirements for off-site transportation of site-generated waste.	Y	NA	Y	Y
To Be Considered (TBCs) Standards					
Department of Energy (DOE) Order 5400.5, entitled "Radiation Protection of the Public and the Environment"	This order establishes standards and requirements for DOE operations with respect to protection of members of the public against radiation and contains a discussion of DOE's as low as reasonable achievable (ALARA) approach.	Y	Y	N	Y
Standards for Protection Against Radiation (10 CFR 20)	Regulation contains the Nuclear Regulatory Commission standards for protection against radiation, and contains an "ALARA" approach.	Y	Y	Y	Y
To Be Considered (TBCs) Standards					
The Native American Grave Protection and Repatriation Act (NAGPRA). Public Law 101-601 (Nov. 16, 1990)	Law provides for protection of Native American graves and for other related purposes.	Y	Y	Y	Y

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
The Migratory Bird Treaty Act (16 USC 703)	Law makes it unlawful to take, kill, or possess any migratory bird, any part, nest, or eggs of any such bird.	Y	Y	Y	Y
The Archaeological Resources Protection Act of 1979. Public Law 96-95	Provides for the protection of archaeological resources on federal and Indian lands.	Y	Y	Y	Y
POTENTIAL STATE CHEMICAL-SPECIFIC ARARS					
Illinois Permits and General Air Pollution Regulations (35 IAC Part 201)	Sets criteria for discharge of contaminants in the environment causing air pollution. Also establishes requirements for permits necessary for construction or modification of any emission source.	Y	Y	Y	Y
Illinois Emission Standards and Limitations for Stationary Sources (35 IAC Part 212)	Establishes emission standards for visible and particulate matter.	Y	Y	Y	Y
Illinois Air Quality Standards (35 IAC Part 243	Establishes air quality standards.	Y	Y	Y	Y
Illinois Water Quality Standards (35 IAC Part 302)	Establishes general use water quality standards for protecting water for aquatic life, agricultural use, primary and secondary contact use, most industrial use, and ensuring the aesthetic quality of the aquatic environment.	Y	Y	Y	Y
Illinois Effluent Standards (35 IAC Part 304)	Prescribes maximum concentrations of various contaminants that may be discharged to the waters of the state.	NA	NA	NA	NA
Monitoring and Reporting Requirements (35 IAC Part 305)	Prescribes requirements for monitoring, reporting, and measuring containment discharges.	N	Y	Y	Y
Sewer Discharge Criteria (35 IAC Part 307)	Places certain restrictions on the types, concentrations and quantities of contaminants which can be discharged into the sewer systems and POTWs.	NA	Y	NA	NA

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
Illinois Primary Drinking Water Standards (35 IAC Part 611)	Establishes health-based standards for public water systems.	Y	Y	Y	Y
Illinois Groundwater Quality Standards (35 IAC Part 620)	Sets groundwater classification and associated water quality standards.	Y	Y	Y	Y
Identification and Listing of Hazardous Waste (35 IAC Part 721)	Defines those solid wastes which are subject to regulations as hazardous waste.	Y	Y	Y	Y
POTENTIAL STATE CHEMICAL-SPECIFIC ARARS (Continued)					
Releases from Solid Waste Management Units (SWMUs) (35 IAC Par 724)	These regulations establish groundwater protection standards and groundwater monitoring requirements for on-site SWMUs.	Y	Y	Y	Y
Permissible Levels of Radiation in Unrestricted Areas (35 IAC Part 1000)	Establishes health-based standards for exposure to radiation levels.	Y	Y	Y	Y
Radioactive Emissions to Unrestricted Areas (35 IAC Part 1000)	Establishes concentration limits for emissions of radioactive materials.	Y	Y	Y	Y
Licensing Requirements for Source Material Milling Facilities (Title 32, Chapter II, Subchapter 6, 332.150B and B2 of the IAC)	Regulation deals with verification sampling during and after removal.	Y	Y	Y	NA
Standards for Protection Against Radiation (Title 32, Chapter II, Subchapter 6, 340.1370 of the IAC)	Regulation establishes standards for protection against radiation hazards, primarily in the occupation setting.	Y	Y	Y	Y
POTENTIAL STATE LOCATION-SPECIFIC ARARS					
Procedures for Permit and Closure Plan Hearings (35 IAC Part 166)	Establishes procedures for permits and closure plan hearings.	Y	Y	Y	Y
To Be Considered (TBCs) Standards					

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
The Archaeological and Palecontological Resources Protection Act (20 ILCS 3435) and the Human Skeletal Remains Protection Act (20 ILCS 3440)	Law related to human remains and artifacts that may be found in the conduct of any private or public construction project. These acts govern the assessment, handling, and disposition of remains and artifacts in Illinois.	Y	Y	Y	NA
To Be Considered (TBCs) Standards (Continued)					
Illinois Historic Resources Protection Act (20 ILCS 3420 and 17 IAC 4180)	Law regarding historic preservation. It requires consultation with the State Historic Preservation Officer for projects that may impact historic resources.	Y	Y	Y	NA
POTENTIAL STATE ACTION-SPECIFIC ARARS					
Illinois Permits and General Air Pollution Regulations (35 IAC Part 201)	Sets criteria for discharge of contaminants in the environment causing air pollution. Also establishes requirements for permits necessary for construction or modification of any emission source.	Y	Y	Y	Y
Illinois Emission Standards and Limitations for Stationary Sources (35 IAC Part 212)	Establishes emission standards for visible and particulate matter.	Y	Y	Y	Y
Illinois Air Quality Standards (35 IAC Part 243)	Establishes air quality standards.	Y	Y	Y	Y
Illinois Water Quality Standards (35 IAC Part 302)	Establishes general use water quality standards for protecting water for aquatic life, agricultural use, primary and secondary contact use, most industrial use, and ensuring the aesthetic quality of the aquatic environment.	Y	Y	Y	Y
Illinois Effluent Standards (35 IAC Part 304)	Prescribes maximum concentrations of various contaminants that may be discharged to the waters of the state.	NA	NA	NA	NA
POTENTIAL STATE ACTION-SPECIFIC ARARS					

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
Monitoring and Reporting Requirements (35 IAC Part 305)	Prescribes requirements for monitoring, reporting, and measuring containment discharges.	Y	Y	Y	Y
Sewer Discharge Criteria (35 IAC Part 307)	Places certain restrictions on the types, concentrations and quantities of contaminants which can be discharged into the sewer systems and POTWs.	NA	Y	NA	Y
Permits (35 IAC Part 309)	Establishes permit requirements for treatment, pretreatment, and discharge requiring NPDES permit.	NA	NA	NA	NA
Pretreatment Programs (35 IAC Part 310)	Establishes pretreatment standards for discharge to a POTW.	NA	Y	NA	NA
Wastewater Treatment Plant Operator Certification (35 Part IAC 312)	Requires a certified operator for a wastewater treatment plant.	NA	Y	NA	NA
Illinois Primary Drinking Water Standards 35 IAC Part 611)	Establishes health-based standards for public water systems.	Y	Y	Y	Y
Illinois Groundwater Quality Regulations (35 IAC Part 620)	Sets groundwater classification and associated water quality standards.	Y	Y	Y	Y
Hazardous Waste Operating Requirements (35 IAC Part 720)	Establishes general provisions, definitions, and rule-making petitions and other procedures.	Y	Y	Y	Y
General Facility Standards (35 IAC Part 724, Subpart B)	Establishes minimum standards which define the acceptable management of hazardous waste.	NA	Y	Y	Y
Releases from Solid Waste Management Units (35 IAC Part 724, Subpart F)	Establishes requirements for monitoring and detection of hazardous constituents from a solid waste management unit.	Y	Y	Y	Y
Standards Applicable to Generators of Hazardous Wastes (35 IAC Parts 721 and 722)	Establishes waste identification and manifesting and pre-transportation requirements for generators of solid wastes.	Y	Y	Y	Y
POTENTIAL STATE ACTION-SPECIFIC ARARS (Continued)					

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
Closure and Post-closure (35 IAC Part 724, Subpart G)	Establishes closure and post-closure care requirements of RCRA disposal units.	NA	Y	Y	Y
Standards Applicable to Tank Systems (35 IAC Part 724, Subpart J)	Establishes requirements for storing hazardous wastes in tanks.	NA	Y	NA	Y
Standards Applicable to Waste Piles (35 IAC Part 724, Subpart L)	Establishes minimum technology requirements for waste piles that would be used to place RCRA hazardous waste.	Y	Y	Y	Y
POTENTIAL STATE ACTION-SPECIFIC ARARS					
Standards Applicable to Landfills (35 IAC Part 724, Subpart N)	Establishes design and operating requirements for hazardous waste landfills.	NA	NA	NA	NA
Corrective Action for Solid Waste Management Units (35 IAC, Part 724, Subpart S)	Establishes procedures and standards for establishes a corrective action management unit (CAMU).	Y	Y	Y	Y
Standards Applicable to Containment Building (35 IAC Part 724, Subpart DD)	Establishes design and operating standards for buildings used for storing hazardous wastes	Y	Y	Y	Y
Standards Applicable to Special Waste Hauling (35 IAC Part 809)	Establishes requirements for hauling of special waste.	Y	Y	Y	Y
Procedural Requirements for All Landfills Exempt from Permits (35 IAC Part 815)	Establishes procedural requirements for landfills exempt from permits.	NA	NA	NA	NA
Transportation Standards (35 IAC Part 723)	Establishes transporter standards and manifesting requirements for hazardous waste haulers.	Y	Y	Y	Y
Personnel Training (35 IAC Part 724)	Requires appropriate training of persons handling hazardous waste.	Y	Y	Y	Y

Table 17

Compliance with Potential ARARs
Ottawa Radiation Areas: NPL-1, NPL-4, NPL-8 and NPL-9
Ottawa, Illinois
(Continued)

POTENTIAL ARARS	REQUIREMENTS	NPL-1 (Alternative 2	NPL-4 (Alternative 2)	NPL-8 (Alternative 6)	NPL-9 (Alternative 2)
POTENTIAL STATE ACTION-SPECIFIC ARARS					
Land disposal Restrictions (35 IAC Part 728)	Requires any waste placed in land-disposal units to comply with LDRs by either attaining specific performance- or technology-based standards.	Y	Y	Y	Y
Radioactive Emissions to Unrestricted Areas (35 IAC Part 1000)	Establishes concentration limits for emissions of radioactive materials.	Y	Y	Y	Y
To Be Considered (TBCs) Standards					
Licensing Requirements for Source Material Miling Facilities (Title 32, Chapter II, Subchapter 6, Part 332.150B and B2 of the IAC)	Regulation deals with verification sampling during and after removal.	Y	Y	Y	Y
To Be Considered (TBCs) Standards (Continued)					
Standards for Protection Against Radiation (Title 32, Chapter II, Subchapter 6, 340.1370 of the IAC)	Regulation establishes standards for protection against radiation hazards, primarily in the occupation setting.	Y	Y	Y	Y
The Archaeological and Paleontological Resources Protection Act (20 ILCS 3435) and the Human Skeletal Remains Protection Act (20 ILCS 3440)	Law related to human remains and artifacts that may be found in the conduct of any private or public construction project. These acts govern the assessment, handling, and disposition of remains and artifacts in Illinois.	Y	Y	Y	NA
Illinois Historic Resources Protection Act (20 ILCS 3420 and 17 IAC 4180)	Law regarding historic preservation. It requires consultation with the State Historic Preservation Officer for projects that may impact historic resources.	Y	Y	Y	NA

APPENDIX A

Responsiveness Summary

RESPONSIVENESS SUMMARY
OTTAWA RADIATION AREAS NPL-1, 4, 8, 9, AND ILLINOIS POWER
OTTAWA, LA SALLE COUNTY, ILLINOIS

PURPOSE

U.S. EPA has prepared this responsiveness summary to meet the requirements of sections 113(k)(2)(B)(iv) and 117(b) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1986 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), which requires the United States Environmental Protection Agency (U.S. EPA) to respond to each of the significant comments, criticisms, and new data submitted on a proposed plan for remedial action. The responsiveness summary provides a summary of comments and concerns identified and received during the public comment period, and U.S. EPA's responses to those comments and concerns. U.S. EPA considered all comments received by U.S. EPA during the public comment period in the selection of the remedial alternatives for the Ottawa Radiation Areas NPL-1, 4, 8, 9, and Illinois Power. The responsiveness summary serves two purposes: it summarizes community preferences and concerns regarding the remedial alternatives, and it shows members of the community how their comments were incorporated into the decision-making process.

This document summarizes written and oral comments received during the public comment period of February 9, 2000, to April 27, 2000. U.S. EPA extended the public comment period twice as a result of requests from the Illinois Department of Nuclear Safety. We have paraphrased the comments to efficiently summarize them in this document. The public meeting was held at 7:00 p.m. on February 24, 2000, at Koolies, 909 West Norris Drive, Ottawa, Illinois. A full transcript of the public meeting, as well as all site related documents, are available for review at the Information Repository, located at the Reddick Library, 1010 Canal Street, Ottawa, Illinois. U.S. EPA received comments and questions during the public meeting from several residents, city officials, and officials from the State of Illinois. Additionally, comments were mailed to U.S. EPA.

OVERVIEW

U.S. EPA announced the proposed remedial alternatives for the Ottawa Radiation Areas NPL-1, 4, 8, 9, and Illinois Power to the public just prior to the beginning of the public comment period. U.S. EPA proposed complete removal, backfilling, and offsite disposal for NPL-1, 4, 9, and Illinois Power and excavation to 10 feet below ground surface (bgs), backfilling, and offsite disposal for NPL-8.

Comments from the State of Illinois

1. Comment: The State had questions and concerns about the transfer of NPL-1, 4, and 9 from the Superfund removal program to the Superfund remedial program.

Response: As early as April 1997, U.S. EPA began discussing the possibility of transferring

NPL-1, 4, and 9 to the Superfund remedial program with the Illinois Department of Nuclear Safety (IDNS). U.S. EPA completed the removal in July 1997 and the remedial investigations at the remaining sites started soon thereafter. Superfund has the discretion of transferring sites for a number of reasons including changes in site-specific conditions, and/or the need for additional characterization and risk assessment, and/or the exceedance of removal funding or timeframe caps. In the case of the Ottawa sites all these conditions were met. The removal program had addressed those sites where residential properties were located and contamination was present. The sites that remained, NPL-1, 4, and 9, were open lots that were not being used and current risks were minimal. Indications at all the remaining sites were that additional characterization and risk assessments were needed to determine the extent and impact of the contamination.

2. Comment: The State questioned whether the U.S. EPA would be recommending a complete excavation at NPL-8 if the cost of earlier removal actions was less.

Response: Present worth cost of a proposed remedy is only one balancing criteria in the nine evaluation criteria U.S. EPA uses to evaluate alternatives. U.S. EPA does not figure past cost into the analysis. An alternative has to provide the best balance of the nine criteria to be selected. Most importantly, the selected remedy needs to be protective of human health and the environment. U.S. EPA believes that Alternative 6 provides the best balance of the nine criteria, including protectiveness and cost-effectiveness, as well as provides for reasonable future recreational use of the property. Regardless of past expenditures, based on analysis of the nine criteria and a consideration of future land use and any associated potential risks, U.S. EPA does not believe that complete removal is necessary at NPL-8. In addition, U.S. EPA is recommending complete removal at NPL-1, 4, 9, and Illinois Power without regard to and distinct from past costs.

3. Comment: The State believes that the transfer of NPL-4 to the Superfund remedial program forced the U.S. EPA to change the assessment of health risks associated with NPL-4.

Response: U.S. EPA moved NPL-4 from the removal program to the remedial program because there was no immediate risk at the property. However, U.S. EPA, as part of the risk assessment during the remedial investigation, evaluated risks to potential future residential users at NPL-4. U.S. EPA determined that risks associated with future residential use at NPL-4 are unacceptable. U.S. EPA is therefore recommending complete removal of radioactive contaminated soils at NPL-4 to allow for residential use.

4. Comment: The State believes that the proposed plan does not explain or identify quantitative risk analyses that (a) support complete excavation at NPL-1 and 4; (b) reject complete excavation at NPL-8; and (c) choose no further action at NPL-2 and 11

Response: The proposed plan is in fact sheet format and provides a brief summary of the information, including the quantitative risk analysis. The proposed plan also indicated that more detailed information about the site was provided in the Site Characterization Reports, Remedial Investigation Reports, Risk Assessment Reports, Engineering Evaluation/ Cost Analysis Reports, and Feasibility Study Reports for NPL-1, 4, 8, 9 and Illinois Power. The proposed plan also noted that these documents are contained in the administrative record for the Ottawa sites and could be obtained through the U.S. EPA or viewed at the Reddick Library, 1010 Canal Street, Ottawa, Illinois. U.S. EPA has supplied copies of these documents to various Departments of the State, including the IDNS. The Record of Decision for NPL-1, 4, 8, 9, and Illinois Power contains a more comprehensive summary than the proposed plan. U.S. EPA is continuing to analyze data and risk associated with NPL-2 and 11 and has not reached a decision on these sites. U.S. EPA has conducted risk assessments at NPL-2 and 11 and this information is available if requested. Again, U.S. EPA has provided the State with copies. As additional information is collected this will also become available, and when a remedial decision is reached for NPL-2 and 11 proper notification and documentation will occur.

5. Comment: The State believes that U.S. EPA's selected remedy for NPL-8, Alternative 6, fails to satisfy six of the nine NCP evaluation criteria.

Response: The Record of Decision (ROD) and the Feasibility Study (FS) for NPL-8 provides detailed analysis of the nine criteria with respect to each of the remedial alternatives proposed by the U.S. EPA. Based on future land use assumptions, provided by the State, U.S. EPA believes Alternative 6 is fully protective. Excavation and off-site disposal of contaminated soil to ten feet below ground surface eliminates unacceptable risks to future recreational users of the property. The State provided ARARs and the U.S. EPA provided a letter to the IDNS dated June 7, 1999 intended as a general outline of the U.S. EPA’s review of State ARARs U.S. EPA reviewed these potential ARARs for compliance with Alternative 6. This analysis is provided in the FS as well as Table 17 of the ROD. U.S. EPA believes Alternative 6 fully complies with ARARs. Analysis of the balancing criteria indicated that Alternative 6 was equivalent to the other alternatives for NPL-8. Partial compliance with long-term effectiveness could be effectively mitigated with engineering controls and operation and maintenance. Alternative 6 failed to meet reduction of toxicity, mobility, or volume through treatment. However, each of the other potential remedial alternatives for NPL-8, including Alternative 4, complete removal, failed to meet this criteria as well. With respect to the modifying criteria of state concurrence and community acceptance, U.S. EPA determined that no significant new information was received during the comment period that would alter U.S. EPA's proposed remedy for the site. Ultimately, U.S. EPA believed that Alternative 6 provided a protective and cost-effective approach allowing for future recreational use of the site.

6. Comment: The State believes that since they can perform a complete removal at NPL-8 for the same cost as the U.S. EPA’s estimate for the 10-foot removal, a complete removal should be conducted.

Response: U.S. EPA appreciates the expertise of the IDNS in matters related to radioactive clean-ups and would encourage the State to provide funding for a betterment of the U.S. EPA's selected remedy or enter into a settlement with the U.S. EPA to pay for the clean-up of NPL-8 as a responsible party lead. If U.S. EPA takes the lead in conducting the clean-up of NPL-8 it also fully intends to reduce cost as much as possible. To that effect if cost can be reduced for the complete removal, it can also be reduced for the 10-foot removal. U.S. EPA is recommending a 10- foot removal because it is a protective and cost-effective remedy. Even if it cost less than U.S. EPA's estimate, U.S. EPA would still implement the remedy that it considers to be protective and cost-effective and therefore we would not expend additional federal dollars to dig deeper.

7. Comment: The State questions some of the excavation procedures and associated costs described in the FS for NPL-8.

Response: The specifics of the excavation procedures can be discussed and finalized during the design of the remedial action. At the FS stage U.S. EPA outlines a conservative approach to implementation for the purposes of providing a conservative cost estimate and possibly preventing cost overruns.

8. Comment: The State believes additional characterization is needed at NPL-1 and 9.

Response: As part of earlier removal activities U.S. EPA removed approximately 17,800 tons of radioactive contaminated soils from NPL-1 and 9. Indications at these sites were that additional characterization and risk assessments were needed to determine the further extent and impact of radioactive contamination. U.S. EPA advanced ninety-five soil borings between the two sites to help determine extent of contamination. Risk assessments indicated that risks to future potential residential users were unacceptable and the U.S. EPA is proposing to remove the radioactive contamination at the sites; backfill; and dispose of the radioactive waste at an off-site licensed facility. As part of the proposed remedies for the sites, additional characterization could occur within the proposed excavation areas defined in the selected remedy, to further delineate the extent of the planned excavation. U.S. EPA believes this work could be incorporated into the remedial design for NPL-1 and NPL-9.

9. Comment: The State questions the implementability and effectiveness of the segmented gate system (SGS) for volume reduction at the sites.

Response: U.S. EPA understands the importance of reducing the volume of waste to be shipped off-site and disposed, since this will be the most expensive element of the remedies. To that effect, U.S. EPA has included a volume reduction goal as a remedy component for all the sites. SGS is one volume reduction methodology that U.S. EPA is considering. The potential use of SGS could be evaluated during pre-design activities by conducting a pilot test. Based on the results from this pilot test, U.S. EPA would consider whether SGS can be implemented at all the sites and if the SGS is a cost-effective approach for reducing the volume of materials to be disposed off-site..

10. Comment: The State questioned the development and application of the clean-up standard for remediation of the radium-226 contaminated soils at the NPL-8 site.

Response: U.S. EPA established the clean-up level for radium-226 in soils based in part on *40 Code of Federal Regulations (CFR) Part 192, Standards for the Stabilization, Disposal, and Control of Uranium and Thorium Mill Tailings.* Detailed analysis of the applicable or relevant and appropriate requirements (ARARs) for the Superfund remedial actions at Ottawa indicated that 40 CFR Part 192 was not applicable due to the fact that the radioactive material at Ottawa is not residual material from inactive uranium processing sites. However, because of the potential relevance and appropriateness of the standard as a basis for developing clean-up levels for radium-226 in soils U.S. EPA will use it as a basis for determining the clean-up level at the Ottawa Radiation Areas.

Standards established in 40 CFR Part 192 were originally developed specifically for the clean-up of uranium mill tailings at 24 sites, not including the Ottawa sites. Subpart B of 40 CFR 192 contains soils standards for surface and subsurface soils. The purpose of the standards was to limit the risk from inhalation of radon decay products in houses built on land contaminated with radium-226 and other radioactive chemicals from tailings, and to limit gamma radiation exposure of people using contaminated land.

The surface soil standard of 5 pCi/g of radium -226 above background is a health-based standard. The relevant source of health risk for surface soil is exposure to gamma radiation, which is the basis for the standard.

The subsurface soil standard of 15 pCi/g of radium-226 above background is not a health-based standard, but rather was developed for use in limited circumstances to allow use of field measurements rather than laboratory analyses to determine when buried tailings had been detected. Specifically, the criterion for subsurface soils was derived for use in locating and remediating discrete deposits of high activity tailings (300-1,000 pCi/g) in subsurface locations at the original 24 sites. The subsurface criterion in Subpart B was originally proposed as 5 pCi/g above background. This criterion in the final rule was changed, not because of a reassessment of the level of contamination that would present a threat to health, but rather to help reduce the cost of locating buried tailings at the original 24 sites. At these sites there was expected to be little subsurface contamination ranging from 5 to 30 pCi/g. The subsurface criterion was not developed for situations where significant quantities of contamination exist between 5 and 30 pCi/g.

The clean-up standard is established as the removal of soils exhibiting levels of radium-226 at 5 pCi/g above background. The background level of radium-226 in the Ottawa area was determined to be 1.2 pCi/g. Therefore, the clean-up level for radium-226 in soils is 6.2 pCi/g.

Please see the February 12, 1998, OSWER Directive 9200.4-25, “Use of Soil Clean-up Criteria in 40 CFR 192 as Remediation Goals for CERCLA sites” for more details.

This clean-up level will be extended to depth the NPL-1, 4, 9 and Illinois Power sites because at these sites the residual contamination at depth can potentially pose a threat based on the future land use assumptions for these properties. However, for NPL-8, supplemental standards of Subpart C 40 C.F.R. Part 192 will be established for residual contaminated soils left below 10 feet bgs. U.S. EPA believes that the contaminated material below 10 feet bgs does not pose a clear present or future hazard and improvements could be achieved only at unreasonably high cost.

11. Comment: The State believes that leaving in place significant amounts of radium-contaminated soils above the clean-up level would turn NPL-8 into a low-level radioactive waste site and, therefore, State of Illinois siting criteria for low-level radioactive waste facilities are applicable.

Response: In a letter dated June 7, 1999, U.S. EPA provided a general outline of the U.S. EPA’s review of State of Illinois ARARs. In patticular, U.S. EPA found that the Illinois Low-Level Radioactive Waste Management Act, 420 ILCS 20/1, which contains siting criteria for low-level radioactive waste facilities, contains no procedural or technical requirements that were applicable or relevant and appropriate for the Ottawa sites. U.S. EPA believes that the siting criteria in the Act is intended for use in the siting of a new facility that would accept low-level radioactive waste for disposal purposes, not for a clean-up associated with a Superfund site where the radioactive waste is residual material, intermingled with other waste, that had previously or historically been disposed at a dump site.

12. Comment: The State believes that: (a) perched water at NPL-4 and NPL-8 should be collected and treated only as necessary to facilitate excavation activities; and (b) groundwater from local aquifers that contain naturally occurring radium should not be pumped and treated.

Response: U.S. EPA agrees that perched water at NPL-4 should only be collected and treated during excavation activities. At NPL-8, U.S. EPA believes that perched water will not be encountered as part of U.S. EPA’s selected remedy of up to 10 foot bgs excavation. As such, the collection and treatment of perched water will not be necessary unless perched water is encountered during excavation. However, a distinction needs to be drawn between perched water and local aquifers.

U.S. EPA has determined that the local aquifers are the St. Peter and Galesville Sandstone units. These are the aquifers used by local private wells and the City of Ottawa. These aquifers are located at a significant depth below the perched water zones. These sandstone units do contain naturally occurring radium from bedrock sources. The City of Ottawa already has mechanisms, i.e. treatment and filtration, in place to deal with this problem for the City’s water supply. It appears that contamination from the Superfund sites has not affected groundwater in the local aquifers, however, periodic monitoring will be necessary to ensure that the aquifers remain unaffected. U.S. EPA believes that the perched water zones are not local aquifers but artifacts of the burrowing and dumping that occurred at the sites as water gets trapped at the interface of the landfilled material and native clay/silt layers. U.S. EPA concluded that the perched water zones are not large enough to be used as local aquifers and that any contamination found in the perched water is not naturally occurring but a result of contaminants leaching from landfilled material.

13. Comment: The State believes that soils, rocks, and crushed concrete with radium levels less than 5 pCi/g should be recycled and not sent to an off-site landfill. These materials should be used as backfill for deep excavations.

Response: The clean-up standard for the Ottawa Radiation Areas has been established at 6.2 pCi/g Please see Section 8.1 of the ROD for additional detail. U.S. EPA believes that excavated material below 6.2 pCi/g should be considered as a source of backfill. However, this material must also be tested for the presence of chemical contamination to ensure that contaminated material is not placed back “in the hole”.

14. Comment: The State requested that a copy of their comments on the proposed plan be entered into the administrative record:

Response: U.S. EPA routinely includes all written and verbal comments on the proposed plan submitted during the public comment in the sites administrative record. As such, a copy of the State’s comments on the proposed plan will be entered into the administrative record for this Record of Decision.

15. Comment: That State disagrees that significant increases in the volume of contaminated radioactive soils shipped off-site during past Superfund removal activities were the result of the “pervasiveness of the landfilled wastes”, as described in the proposed plan. Instead, they believe that it was the result of the U.S. EPA’s excavation contractor’s inefficient procedures and practices and U.S. EPA’s failure to control costs.

Response: Original estimates of the volume of radioactive soils at the Ottawa sites failed to take into account significant volumes of radioactive soils found at depths below the initial one to two feet of surface material. U.S. EPA believes that the significant increase in volumes to be shipped and disposed off-site at each one of the Ottawa removal sites due to the radioactive materials at depth was the primary reason for the increased cost of the removal actions.

16. Comment: The State indicates that Alternative 4 for NPL-8 is the only alternative that fully meets the threshold criteria for providing long-term effectiveness and permanence.

Response: As part of U.S. EPA’s nine criteria analysis of potential remedies, long-term effectiveness and permanence is not identified as threshold criterion but as modifying criterion. Within the nine criteria analysis, U.S. EPA identifies protection of human health and the environment and compliance with applicable or relevant and appropriate (ARARs) federal and state regulations, or provide a basis for a waiver, as threshold criteria. A remedy must achieve these two threshold criteria to be selected. All the remedial alternatives considered for NPL-8 met the threshold criteria of protectiveness and compliance with ARARs. The modifying criteria, of which long term effectiveness and permanence is one, are used to compare the alternatives to each other. While U.S. EPA agrees that Alternative 4 is the only remedial alternative that fully meets the modifying criterion of long-term effectiveness and permanence, other alternatives while only partially meeting this criterion can be acceptable with the implementation of various engineering controls and proper operation and maintenance.

17. Comment: The State indicates that the NPL-8 Feasibility Study (FS) erroneously identifies the Remedial Action Objectives (RAOs), rather than the Preliminary Remediation Goals (PRGs), as the clean-up standard for contaminated soil at NPL-8.

Response: RAOs provide a general description of what the clean-up will accomplish. Current and reasonable anticipated future land-use plays a critical role in the development of these objectives. PRGs can serve as clean-up levels that are protective of human health and the environment and can be the objectives of the remedial action. PRGs can be developed based on risk calculations or applicable or relevant and appropriate requirements (ARARs). The clean-up standard for the radioactive contaminated soils in Ottawa was based on *40 Code of Federal Regulations (CFR) Part 192, Standards for the Stabilization, Disposal, and Control of Uranium and Thorium Mill Tailings.* A more detailed discussion of development of the clean-up standard for the Ottawa Radiation Areas can be found in Section 8.1 of the Record of Decision.

18. Comment: The State believes that characterization of the NPL-8 site should be redone so that the scope of the required excavation can be more accurately defined.

Response: U.S. EPA advanced a total of 96 borings as part of the remedial investigation on NPL-8 and adjacent properties to determine the extent of radioactive contamination in surface and subsurface soils. These borings defined the extent of the intermingled fill and radioactive materials at NPL-8. Risk assessment based on the collected data found unacceptable risk at NPL-8. As such, U.S. EPA is selecting removal of contaminated soil to a maximum depth of 10 feet to allow for recreational use of the property. The parameters of additional characterization, confirmational sampling, and/or surveying necessary to implement the selected remedial action at NPL-8 will be determined as part of remedial design work.

19. Comment: The State indicated that the U.S. EPA did not provide a cost estimate for the Illinois Power Site in the proposed plan.

Response: A cost estimate for Illinois Power is provided in Table 16 of the ROD.

20. Comment: The State assumes that the commercial owner of the Illinois Power property will pay for all necessary response actions at this site.

Response: U.S. EPA has not yet made a determination on the status or liability of any parties at the Illinois Power site. Subsequent to this Record of Decision, U.S. EPA will determine if any parties should be identified as potentially responsible parties for the Illinois Power property.

21. Comment: The State questioned why the clean-up at NPL-8 should be different from the clean-up at a Superfund site in West Chicago known as Reed-Keppler Park. That site contains radioactive contamination at depth and is being used as a recreational area.

Response: Even though Superfund sites may have similar contaminants, each has specific site conditions which make them unique. Therefore, it is often difficult to compare one site to another. However, U.S. EPA attempts to maintain consistency, whenever possible, between sites with similar conditions. One important distinction of the Reed-Keppler Park Superfund site is that although it is being used as a recreational area, it is surrounded by residential areas. Indications were that future housing demands in this area of West Chicago may force residential development of areas of the park. Clean-up of the site was driven by the potential future residential development of the park. This situation is similar to the clean-ups of NPL-1, 4, and 9 in Ottawa, where even though the sites are not currently being used as residential properties, conditions at the sites indicated that future residential use was possible. As such, U.S. EPA considered remedial options similar to Reed-Keppler for these sites. However, site-specific conditions at NPL-8, in particular: (a) State ownership of the property and designation of the property as a State park; and (b) information from the State that the site would be used for recreational purposes in the future, allowed the U.S. EPA to consider other protective and more cost effective options for NPL-8 than complete removal.

22. Comment: The State believes that U.S. EPA has completely failed to justify rejection of the 5 pCi/g clean-up standard at NPL-8.

Response: Section 8.1 of the ROD describes the use of 40 CFR 192 to develop a clean-up standard for radioactive soils at the Ottawa Radiation sites of 5 pCi/g above background. At NPL-8, the standard will be used to a maximum depth of 10 feet bgs based on the polential risks associated with future recreational use of the property. Below 10 feet bgs supplemental standards of Subpart C of 40 CFR 192 will be used because the U.S. EPA believes that contaminated material below 10 feet does not pose a risk based on the future recreational land use anticipated at the site. Future recreational use at NPL-8 was determined by the State of Illinois who owns the property.

Errors on page 3 of 19 in Table 4-3, Detailed Analysis of Alternatives, Compliance with Potential ARARs, of the NPL-8 FS, may have caused some confusion. 40 C.F.R. 192 is listed as a potential ARAR and compliance with each of the NPL-8 remedial alternatives is indicated.

Table 4-3 shows only Alternative 4 complying with 40 CFR 192, in actuality all of the alternatives, except Alternative 1 - No Action, comply with this regulation. This error will be corrected and the revision will be included in the ROD and administrative record.

23. Comment: The State was concerned that the remedial action objectives (RAOs) listed in the NPL-8 FS were not quantitative standards like the ones for NPL- 1, 4, and 9.

Response: Quantitative standards for all of the sites based on 40 CFR 192 is established in the ROD. The use of a qualitative description of the RAOs for NPL-8 versus a quantitative description for NPL-1, 4, and 9 is a reflection of the differences in the sites, particularly future land use assumptions.

24. Comment: The State was concerned that the proposed plan does not establish the clean-up standard for NPL-8.

Response: The clean-up standard for NPL-8, as well as NPL-1, 4, and 9, is established in the ROD. The proposed plan for the Ottawa Radiation sites was intended to provide general information to the public on U.S. EPA's decision making process for selecting among the remedial alternatives at each site and to solicit public comment.

25. Comment: The State was concerned that the proposed plan did not identify ARARs for NPL-8.

Response: An ARARs anaysis for each of the sites is provided in the supporting documentation; FS and EE/CAs, as well as the ROD. This supporting documentation was provided to the State for review and made available to the public in the administrative record. The proposed plan for the Ottawa Radiation sites was intended to provide a summary of the information presented in the supporting documentation. As such, the proposed plan provided U.S. EPA's determination with respect to overall ARAR compliance for each alternative.

26. Comment: The State indicates that U.S. EPA provides no information about how much protection each of its remedial options would provide.

Response: U.S. EPA defines protectiveness as a threshold criterion. A remedial option is either protective or it is not protective. U.S. EPA views protectiveness as "yes or no" question. In determining whether a remedial option should be considered protective, U.S. EPA evaluates the ability of the remedial option to reduce unacceptable risk at a site. U.S. EPA has provided information to support the selection of the proposed remedies for the site by developing documentation to assess unacceptable risk at the sites and then evaluating what remedial options can reduce the identified risk. These remedial options are analyzed based on nine criteria, including the threshold criteria of protectiveness and compliance with ARARs; the modifying criteria of short and long-term effectiveness, reduction of toxicity, implementability, and cost;

and the balancing criteria of state and community acceptance. Remedial options, that U.S. EPA does not believe reduce risk, or are not protective, based on current and/or reasonable potential future land use or do not comply with ARARs, would not be carried through the analysis.

27. Comment: The State believes that the proposed plan does not adequately address flood issues or erosion on the NPL-8 cutbank of the Fox River.

Response: According to a Federal Emergency Management Agency (FEMA) Flood Insurance Survey study, the surface of NPL-8 is not in a flood plain. The study provided 10, 50, 100, and 500 year flood stage elevations for the corporate limits of Ottawa. The study indicated that the flood stage elevations for the northeastern corporate limits of Ottawa, the general vicinity of NPL-8, for 10, 50, 100, and 500 year floods were at elevations of 470.6 ft, 474.5 ft, 476 ft, and 480 ft, respectively. Although these flood stage elevations would not impact the surface of NPL-8, which is at an elevation of 485 ft, the flood water would probably back up into an on-site drainage ditch which is connected to a local creek and feeds into the Fox River. U.S. EPA did not detect radioactive contamination in the ditch and as part of remedial activities the ditch may be backfilled to grade.

Both the proposed plan and the ROD discuss the possibility of engineering controls along the bank of the Fox River to control erosion if it becomes a concern. Samples taken in the sediments and water of the Fox River during the investigation did not indicate radioactive contamination. However, long-term erosion of the bank and the need for engineering controls will be evaluated during the remedial design. Engineering controls are a proven, available technology for preventing the erosion of riverbanks at other Superfund sites, including landfills along rivers with constructed caps.

27. Comment: The State proposed that the remedial actions at NPL-1, 4, 8, and 9 be structured as a state-lead project.

Response: Discussions on the lead for the next phase of the Ottawa Radiation project will be part of negotiations with potentially responsible parties (PRPs) prior to the start of the remedial design/remedial action (RD/RA). Please note that the Illinois Power site would also be included in the overall clean-up.

28. Comment: Past characterization and excavation procedures at the Ottawa Radiation Areas have not been cost-effective.

Response: U.S. EPA has been and continues to be committed to providing the most cost-effective approach for remediating the Ottawa Radiation Areas. U.S. EPA believes that the efficiency of characterization and excavation procedures increased as the Ottawa projects have progressed. U.S. EPA believes its decision to transfer some of the sites to the remedial program will improve the efficiency of future remediation at these sites. U.S. EPA has been able to conduct additional characterization efforts and more accurately assess risks posed by contamination at the remaining sites. In addition, work to be conducted during the remedial design phase will allow the lead agency to examine the most cost-effective approach to excavating and reducing the volume of contaminated materials that will be shipped and disposed off-site.

29. Comment: The State believes that U.S. EPA has made few subsurface measurements of radioactive contamination at any of the Ottawa sites and that because of this, there are no accurate volume estimates at any of these sites.

Response: The investigation and characterization U.S. EPA conducted at NPL-1, 4, 8, 9, and Illinois Power included approximately 235 soil borings from which surface and subsurface samples were collected. Based on the data collected from these borings, U.S. EPA estimated the volume of contaminated material using proven computer models. It should be noted that these volumes are estimated. These estimates provide a good starting point for developing remedial alternatives to address the contamination. Volume estimates will be refined during the remedial design or remedial action as more information becomes availagle. Results of the investigation and volume estimates are provided in the investigation and characterization reports included in the administrative record for the sites.

30. Comment: The State suggested using an approach similar to another radiation Superfund site in West Chicago to develop a reasonably accurate understanding of the horizontal and vertical distribution of the contamination.

Response: U.S. EPA appreciates the value of utilizing technologies proven to be effective at the West Chicago radiation clean-up, as well as other Superfund sites. In this particular instance for West Chicago, the methodology described by the State is used as a design tool to further delineate the area to be excavated, once a contaminated spot is found. This approach can be examined in more detail during the remedial design phase to determine its potential effectiveness at the Ottawa sites.

31. Comment: The State emphasized the importance of maintaining contractor oversight and proposed specific roles for contractors during the RD/RA.

Response: U.S. EPA agrees that contractor oversight is one of many important elements of an effective clean-up. Plans developed during the remedial design will provide details on the roles and responsibilities of the lead Agencies and the contractors.

32. Comment: The State believes that excavated material below 5 pCi/g of radium must be reused as backfill.

Response: The clean-up standard for the Ottawa Radiation Areas has been established at 6.2

pCi/g. Please see Section 8.1 of the ROD for additional detail. U.S. EPA believes that excavated material below 6.2 pCi/g should be considered as a source of backfill. However, this material must also be tested for the presence of chemical contamination to ensure that contaminated material is not placed back “in the hole”.

33. Comment: The State raised specific concerns about excavation procedures and the possible shipment and disposal of clean material during the earlier Superfund removal actions.

Response: U.S. acknowledges that many difficult circumstances were encountered during the removal action. U.S. EPA is also aware that the State often disagreed with the approach taken by the U.S. EPA and its contractors to resolve these difficulties. However, U.S. EPA considered the input provided by all the parties involved in the removal before making a decision and continually tried to improve the efficiency of the removal action.

U.S. EPA believes its decision to transfer NPL 1, 4, and 9 to the remedial program will improve the efficiency of future remediation at these sites. U.S. EPA has been able to conduct additional characterization efforts and more accurately assess risks posed by contamination at the remaining sites. In addition, work to be conducted during the remedial design phase will allow the lead agency to examine the most cost-effective approach to excavating and reducing the volume of contaminated materials that will be shipped and disposed off-site.

34. Comment: The State believes that the capping alternatives, Alternatives 2 and 3, as well as the partial excavation alternatives, Alternatives 5 and 6, proposed for NPL-8, should be eliminated because they do not meet the criteria for overall protection of human health and the environment, compliance with ARARs, and long-term effectiveness, not because they limit the State’s recreational development options.

Response: U.S. EPA evaluated all the proposed alternatives for NPL-8 against nine criteria including protectiveness, compliance with ARARs, short and long-term effectiveness, treatability, implementability, cost, and state and community acceptance. U.S. EPA believes all the alternatives considered (except for the No Action alternative) are protective and comply with ARARs. Alternative 6 provides the best balance among the remaining criteria and allows for fairly unrestricted future recreational use of the property. The FS for NPL-8 provides a detailed analysis of the alternatives considered for NPL-8 against the nine criteria.

35. Comment: The State believes it is noteworthy that the NPL-8 FS recognizes that proposed Alternative 9, institutional controls, excavation, perched water collection, and on-site disposal, would create a low-level radioactive waste “landfill” and that this definition should be extended to all alternatives where waste is left in place.

Response: Alternative 9 was a proposed remedial alternative that was not carried through detailed analysis with the nine criteria. While U.S. EPA believes that the alternative was protective, U.S. EPA also believes that, based on State of Illinois and federal regulations, it would be difficult to site and construct a new landfill on the NPL-8 property. Alternative 9 proposed to excavate all the soil, stage it, construct a new landfill, place the excavated soil in the landfill, and then cap the site. There is an important distinction between this alternative and other remedial alternatives that were carried through for detailed analysis. For Alternative 9, a new landfill would be sited and constructed, on-site, for the purposes of disposing and containing excavated soils from the landfill. This is distinct from other alternatives which propose to leave contaminated soils in-place as part of historic dumping activities or excavate and dispose of them in an existing off-site, licensed landfill. To site and construct a new landfill for the purposes of disposing of excavated contaminated soils on-site, additional state and federal regulations would be considered applicable or relevant and appropriate. Although it may have been possible to waive these regulations, U.S. EPA felt a sufficient number of other alternatives existed that would address the contamination at the site and comply with state and federal regulations that Alternative 9 could be eliminated from further consideration.

36. Comment: The State believes that short-term excavation exposure risks are overstated.

Response: U.S. EPA believes there are some short-term risks associated with the excavation of contaminated material at the sites. However, engineering controls can be used to reduce these risks and therefore, alternatives with an excavation component fully meet the criteria for short-term effectiveness.

37. Comment: The State believes that a statement in the NPL-8 FS that Alternative 4 would simply transfer radium contamination to another off-site location is meaningless.

Response: This statement was intended to convey that there is a preference for treatment at Superfund sites and that in many circumstances, disposal of contaminated material, while protective, is the only available clean-up alternative. In the case of radioactive material, because the toxicity of the radioactive soils cannot be reduced through treatment, proper containment of the material either on-site or off-site is considered the only viable alternative.

38. Comment: The State believes that clean material, including overburden and concrete slabs, should be used as backfill.

Response: U.S. EPA agrees that material that can be confirmed clean, by testing or other methods, can be considered for use as backfill. Exact specifications for backfill material can be determined during the remedial design phase.

39. Comment: The State believes that the nature and extent of organic and metal contamination should be known before the ROD is issued.

Response: Some soils at the sites contain, in addition to radiological contaminants, organic and/or inorganic chemicals. Additional sampling will be conducted as pre-design activities at NPL-1, 4, 9, and the Illinois Power site to determine the extent of chemical contamination. If organic and/or inorganic chemical contamination requires further remediation beyond the area of defined radiological contamination, this Record of Decision (ROD) will be modified through either an Explanation of Significant Differences (ESD) or ROD Amendment as appropriate.

40. Comment: The State believes that the management of contaminated perched water at the sites needs to be analyzed further.

Response: U.S. EPA agrees that the specifics of perched water management can be analyzed in more detail during the remedial design activities.

41. Comment: The State has concerns about the characterization of the contamination at NPL-1, including cost estimating, downhole gamma survey methodology, soil sampling methodology, and the correlation of count rates versus radium 226 concentrations..

Response: The NPL-1/Area A areal extent of radium contamination was primarily based on one sample (SB-48) exceeding 5 pCi/g as well as six samples surrounding SB-48 that were below 5pCi/g. These levels corresponded very closely with the IDNS surface gamma survey that was conducted while the excavation was open. The vertical extent of radium contamination was based on the downhole gamma results from SB-48 and the cut from the former excavation. The NPL-1/Area B areal and vertical extent of radium contamination was primarily based on one sample (SB-44) exceeding 5 pCi/g as well as four samples surrounding SB-44 that were below 5pCUg. These levels corresponded very closely with the IDNS surfacd gamma survey that was conducted from the sidewalls of the open excavation. The cut from the former excavation was also used to define the areal extent. Although additional borings may refine the volume estimates, we believe the volume estimates are reasonable for developing a Feasibility Study cost estimate.

The downhole gamma measurements were measured with a lead-shielded NaI detector with a 360-degree field of view. Although directional measurements would have provided additional data and additional borings may have led to a more refined volume estimate, we believe the gamma measurements using a 360-degree field of view are reasonable for developing the volume estimates for the Feasibility Study.

Typically, soil samples were collected near the interval indicating the highest gamma levels as measured with a NaI detector. The interval may have been varied to insure that the sample was collected from the "historical" fill (typically consisting of crushed brick and stag) and not the clean backfill placed during the removal action. In addition, the interval may have been varied due to poor soil/fill recovery from the split-spoon sampler.

We concur that there is a poor correlation for the plot of the gamma count rates compared to the

Ra-226 concentrations; and for the plot of the NaI count rates compared to the Ra-226 concentrations. However, based on the analytical results that are supported by the IDNS survey, we believe the volume estimates are reasonable for developing a feasibility study cost estimate.

The need for additional detailed characterization, not for the purposes of volume and cost estimating but to help better define the area of excavation, can be examined as part of the remedial design activities.

Community Comments

1. Comment: Several commenters expressed concern about the proposed 10 foot removal, Alternative 6, at NPL-8 and wished to see complete removal at the site.

Response: U.S. EPA considered a number of remedial alternatives at NPL-8 from capping to complete removal. U.S. EPA evaluated these alternatives using nine criteria established by the U.S. EPA for comparison of alternatives to determine which is protective of human health and the environment and complies with fedeid and state regulations; and provides the best balance of long and short term effectiveness, ease of implementation, treatment, cost effectiveness, and community and state support. In addition, at many Superfund sites current and potential future land use plays a critical role. U.S. EPA determined that the 10 foot removal was protective of human health and the environment and complied with regulations. The 10 foot removal also provided the best balance of the remaining criteria while being a cost effective approach to meeting the State's future needs for land use at the site.

2. Comment: One commenter raised questions about current and future land use assessment for the NPL-8 site as well as surrounding properties.

Response: Current and potential future land use plays a pivotal role in remedy selection at many Superfund sites. When U.S. EPA assesses risk for a Superfund site, land use is critical in determining the various exposure scenarios that are examined. In the case of NPL-8, two factors played a key role in assessing recreational exposure scenarios for the site. First, NPL-8 is owned by the State of Illinois and is designated as a State park, and second, the State of Illinois indicated specific future recreational uses to the U.S. EPA in a letter dated September 4, 1996. This determination by the State helped U.S. EPA develop remedial alternatives that would allow for fairly unrestricted recreational use U.S. EPA determined that the 10 foot removal was protective and cost-effective under the State's future land use scenarios for the NPL-8 property as well as surrounding areas not directly affected by the radioactive contamination.

3. Comment: Two commenters supported the proposed remedial action of 10 foot removal, backfill, and off-site disposal at NPL-8.

Response: U.S. EPA appreciates comments that support EPA's proposed remedy.

4. Comment: Another commenter had concerns about exposure to radioactive soils while working on a highway project along the right-of-way of Route 71 near the NPL-8 site.

Response: As part of the remedial investigation at NPL-8, U.S. EPA collected a number of samples at the property between the site and Route 71, known as the Rowe property. Radioactive contamination was found to extend just beyond the fence line of the NPL-8 property but not onto the Rowe property. Even though samples were not specifically collected along the Route 71 right-of-way, U.S. EPA has no reason to believe that contamination exists in this area. However, U.S. EPA recommends that radioactive testing or surveying be conducted for future projects thatrequire excavation in areas near the Superfund sites or in areas of Ottawa that may have received landfill materials.

5. Comment: Another commenter had questions concerning the past removal activities at one of the Superfund removal sites, NPL-11, and U.S. EPA's plans for this property.

Response: U.S. EPA conducted a removal action at the NPL-11 site that included relocation of a house, soil removal, and deed restrictions on the property. Some of the radioactive contamination at NPL-11 was discovered beneath the water table and proved difficult to remove. U.S. EPA conducted additional sampling at NPL-11 to determine the extent and potential risks associated with any radioactive material that remains. The results and evaluation of the data have not been concluded. As additional information is collected and when a remedial decision is reached for NPL-11 proper notification and documentation will occur.

6. Comment: One commenter wanted to know how close the Ottawa Radiation Areas are to the Kewanee water supply.

Response: Kewanee is a town in northwest, central Illinois located about 50 miles west of Ottawa. The Ottawa sites are all located within the city limits or within a one-mile radius of the city limits of Ottawa, Illinois.

Comment of the City of Ottawa

1. Comment: Overall, the City of Ottawa indicated its support of the remedies proposed by the U.S. EPA. The City also provided information regarding future construction projects that will occur in the vicinity of a number of the Superfund sites.

Response: U.S. EPA appreciates the support of the City of Ottawa. U.S. EPA promotes the reuse of Superfund properties whenever possible. U.S. EPA will continue to work with the City of Ottawa to ensure that the sites do not pose a threat to workers or users of future City facilities and that future City projects do not conflict with the remediation of any of the sites.

APPENDIX B

Administrative Record

U.S. ENVIRONMENTAL PROTECTION AGENCY

ADMINISTRATIVE RECORD
FOR
OTTAWA RADIATION AREAS SUPERFUND SITE
OTTAWA, LASALIE COUNTY, ILLINOIS

UPDATE #5
FEBRUARY 3, 2000

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	00/00/00	Muno, W., U.S. EPA	Ryan, J., Office of Illinois Attorney	Letter re: U.S. EPA's General Notice of Potential Liability and 104(e) Information Request for the Ottawa Radiation NPL-8 Site w/Attachments	3
2	00/00/00	Muno, W., U.S. EPA	Manning, B., Illinois Department of Natural Resources	Letter re: U. S. EPA's General Notice of Potential Liability and 104 (e) Information Request for the Ottawa Radiation NPL-8 Site w/Attachments	14
3	11/00/96	Roy F. Weston, Inc.	U. S. EPA	Quality Assurance Project Plan for the Ottawa Radiation Areas Site; Volume 1 (Text, Tables, Figures and Appendices A-C)	300
4	12/13/96	Roy F. Weston, Inc.	U. S. EPA	Letter re: Revision 4 to the Addendum for the Quality Assurance Project Plan and Field Sampling Plan for the Ottawa Radiation Areas Site w/ Attached Revisions	16
5	09/03/97	Rogers, R., Illinois EPA	Mankowski, M., U. S. EPA	Letter re: State of Illinois ARARs for the Ottawa Radiation Areas w/Attached Letter to Weston Forwarding ARARs Table	12
6	11/00/97	Roy F. Weston, Inc.	U. S. EPA	Amended Quality Assurance Project Plan for the Ottawa Radiation Areas NPL-1, NPL-4, and NPL-9: Volume 1 (Text, Tables, Figures and Appendices A-F)	360

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	
7	01/00/98	Roy F. Weston, Inc.	U.S. EPA	Alternative Array Document for the Ottawa Radiation Areas Site Conservation Area (NPL-8)	191
8	04/00/98	Roy F. Weston, Inc.	U.S. EPA	Technical Memorandum: Supplemental Risk Assessment: Future Commercial /Industrial Land Use for the Ottawa Radiation Conservation Area NPL-8 Site	59
9	04/00/98	Roy F. Weston, Inc.	U.S. EPA	Technical Memorandum: Human Health Risk-Based Soil Cleanup Levels for the Ottawa Radiation Conservation Area NPL-8 Site	24
10	04/00/98	Roy F. Weston, Inc.	U.S. EPA	Remedial Investigation Report for the Conservation Area (NPL-8) Site	456
11	07/24/98	Means, B., National Remedy Review Board	Muno, W., U.S. EPA	Memorandum re: NRRB's Recommendation for the Ottawa Radiation Super-fund Site	3
12	08/28/98	Manning, B., Illinois Department of Natural Resources	Muno, W., U.S. EPA	Letter re: INDR's Response to U.S. EPA's 104 (e) Information Ottawa Radiation NPL-8 Site	132
13	09/04/98	Manning, B., Illinois Department of Natural	Muno, W., U.S. EPA	Letter re: Fox River State Park at the Request for the Ottawa Radiation NPL-8 Site	2
14	09/00/98	Roy F. Wesson, Inc.	U.S. EPA	Risk Assessment Report for the Conservation Area (NPL -8) Site	336
15	11/12/98	Carney, W., U.S. EPA	Buck, F., City of Ottawa	Letter re: U.S. EPA's 104 (e) Information Request for the Ottawa Radiation NPL-8 Site w/Attachments	14

NO.	DATE.	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	
16	12/00/98	Muno, W. U.S. EPA	Apple , G., Illinois Department of Nuclear Safety	Letter re: U.S. EPA's Request for Illinois ARAR's for the Ottawa Radiation NPL-8 Site	2
17	01/20/99	Carney, W., U.S. EPA	Luminous Processes Inc., et al.	Letter re: U.S. EPA's 104 (e) Information Request for the Ottawa Radiation NPL-8 Site w/Attachment	16
18	01/28/99	Yonkauski, S., Illinois Department of Natural Resources	Apple , G., Illinois Department of Nuclear Safety	Memorandum re: ARARs for the Ottawa Radiation Areas	3
19	01/00/99	Roy F. Weston Inc.	U.S. EPA	Site Characterization Report for the Ottawa Radiation NPL-8 Sites	296
20	01/29/99	Orticger, T., Illinois Department of Nuclear Safety	Muno, W. U.S. EPA	Letter re: IDNS Response to U.S. EPA's Request for Illinois ARARs for the Ottawa Radiation NPL-8 Site	4
21	01/29/99	Leigh , K., City of Ottawa	Cuffman, C., U.S. EPA	Letter re: City of Ottawa's Request for Information for the Ottawa Radiation NPL-8 Site	3
22	02/24/99	Muno, W., U.S. EPA	Apple , G., Illinois Department of Nuclear Safety	Letter re: U.S. EPA's Request for Illinois ARARs for the Ottawa Radiation NPL-1, NPL-4, and NPL-9 Sites	2
23	03/00/99	Roy F. Weston Inc.	U.S. EPA	Site Characterization Report for the Ottawa Radiation NPL-4 Site	318
24	03/00/99	Roy F. Weston Inc.	U.S. EPA	Site Characterization Report for the Ottawa Radiation NPL-9 Site	284
25	03/00/99	Roy F. Weston Inc.	U.S. EPA	Site Characterization Report for Non-Time Critical Removal Support for the Illinois Power Site	97

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
26	03/12/99	Orticiger, T., Illinois Department of Nuclear Safety	Muno, W., U.S. EPA	Letter re: IDNS Response to U.S. EPA's Request for Illinois ARARs for the Ottawa Radiation NPL-1, NPL-4, and NPL-9 Sites	4
27	04/00/99	Roy F. Weston Inc.	U.S. EPA	Risk Assessment Report for the Illinois Power Site	115
28	04/06/99	Rogers, R., Illinois EPA	Mankowski, M., U.S. EPA	Letter re: ARARs for the Ottawa Radiation NPL-1, NPL-4 and NPL-9 Sites	1
29	06/00/99	Roy F. Weston, Inc.	U.S. EPA	Site Characterization Report for the Ottawa Radiation NPL-1 Site	310
30	06/00/99	Roy F. Weston Inc.	U.S. EPA	Risk Assessment Report for the Illinois Power Site	117
31	06/00/99	Roy F. Weston, Inc.	U.S. EPA	Site Characterization Report for the Ottawa Radiation NPL-9 Site	284
32	06/00/99	Roy F. Weston, Inc.	U.S. EPA	Site Characterization Report for Non-Time Critical Removal Support Illinois Power Site	100
33	06/07/99	Muno, W., U.S. EPA	Ortciger, T., Illinois Department of Nuclear Safety	Letter re: U.S. EPA's Review of Illinois ARARs for the Ottawa Radiation NPL-1, NPL-4, NPL-8 and NPL-9 Sites	2
34	06/07/99	Tindall, K., U.S. EPA	Rowe, R., Marseillies IL, Resident	Letter re: U.S. EPA's 104 (e) Information Request for the Ottawa Radiation NPL-8 Sites w/Attachments	14
35	06/09/99	Muno, W., U.S. EPA	Means, B., National Remedy Review Board	Memorandum re: U.S. EPA's Response to the NRRB's Recommendations on the Ottawa Radiation Areas, NPL-8 Site Superfund Site	6
36	07/00/99	Roy F. Weston Inc.	U.S. EPA	Site Characterization Report for the Ottawa Radiation NPL-4 Site	309

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
37	07/00/99	Roy F. Weston Inc.	U.S. EPA	Engineering Evaluation/ Cost Analysis Report for Non-Time Critical Removal Support for the Ottawa Radiation NPL-4 Site	215
38	07/00/99	Roy F. Weston, Inc.	U.S. EPA	Engineering Evaluation/ Cost Analysis Report for Non-Time Critical Removal Support for the Ottawa Radiation NPL-9 Site	219
39	07/00/99	Roy F. Weston, Inc.	U.S. EPA	Engineering Evaluation/ Cost Analysis Report for the Ottawa Radiation NPL-1 Site	237
40	07/00/99	Roy F. Weston, Inc.	U.S. EPA	Feasibility Study Report for the Ottawa Radiation NPL-8 Site	320
41	08/00/99	Roy F. Weston Inc.	U.S. EPA	Engineering Evaluation/ Cost Analysis Report for the Ottawa Radiation NPL-1 Site	215
42	08/00/99	Roy F. Weston, Inc.	U.S. EPA	Risk Assessment Report for the Ottawa Radiation NPL-1 Site	216
43	08/31/99	Roy F. Weston, Inc.	U.S. EPA	Engineering Evaluation/ Cost Analysis Report for Non-Time Critical Removal Support for the Ottawa Radiation NPL-4 Site	212
44	08/31/99	Roy F. Weston, Inc.	U.S. EPA	Engineering Evaluation/ Cost Analysis Report for Non-Time Critical Removal Support for the Ottawa Radiation NPL-9 Site	193
45	08/31/99	Roy F. Weston, Inc.	U.S. EPA	Engineering Analysis Report NPL-1 Site for the Ottawa Radiation Areas	216
46	10/00/99	Roy F. Weston, Inc.	U.S. EPA	Risk Assessment Report for the Ottawa Radiation NPL-1 Site	405
47	10/00/99	Roy F. Weston, Inc.	U.S. EPA	Risk Assessment Report for the Ottawa Radiation NPL-2 Site	143

U.S. ENVIRONMENTAL PROTECTION AGENCY

ADMINISTRATION RECORD
FOR
OTTAWA RADIATION AREAS SUPERFUND SITE
OTTAWA, LASALLE COUNTY, ILLINOIS

UPDATE #6
FEBRUARY 10, 2000

NO.	DATE.	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	02/00/00	U.S. EPA	Public	Proposed Plan for the Ottawa Radiation Areas -- NPL-1,4, and 9 Superfund Sites	30

U.S. ENVIRONMENTAL PROTECTION AGENCY

ADMINISTRATION RECORD
FOR
OTTAWA RADIATION AREAS SUPERFUND SITE
OTTAWA, LASALLE COUNTY, ILLINOIS

UPDATE #7
MAY 9, 2000

NO.	DATE.	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	02/24/00	Siska. K., C. S. R.	U.S. EPA	Transcript: February 24, 2000 Proposed Plan Public Meeting for the Ottawa Radiation Areas NPL-1, 4, 8 and 9	51

U.S. ENVIRONMENTAL PROTECTION AGENCY

ADMINISTRATION RECORD
FOR
OTTAWA RADIATION AREAS SUPERFUND SITE
OTTAWA, LASALLE COUNTY, ILLINOIS

UPDATE #8
AUGUST 4, 2000

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
	04/27/00	Ortiger, T., State of Illinois/ Department of Nuclear Safety	Lyons, F., U.S. EPA	Letter: IDN's Comments on U.S. EPA's Proposed Cleanup Plan for the Ottawa Radiation Areas NPL-1, 4, 8 and 9 Sites w/ Attachment Exhibits 1-31	434
	04/27/00	Rayan, J. & M. Dunns State of Illinois/ Office of the Attorney General	Lyons, F., U.S. EPA	Letter re: Attorney General's Comments on U.S. EPA' Proposed Plan for the Ottawa Radiation Sites NPL-1, 4, 8 and 9	2
	07/12/00	Mankowski, M., U.S. EPA	File	Memorandum re: Revised Page 3 of 19 for Table 4-3 of the Feasibility Study Report for NPL-8 at the Ottawa Radiation Areas Site	2

APPENDIX C

Letter from Illinois Department of Natural Resources Outlining Future Land Use at NPL-8

ILLINOIS
DEPARTMENT OF
NATURAL RESOURCES
524 South Second Street, Springfield 62701-1787
Jim Edgar, Governor ● Brent Manning, Director

September 4, 1998

William Muno, Director
Superfund Division
U.S. Environmental Protection Agency
77 West Jackson Blvd.
Chicago, IL 60604-3590

RE: Ottawa Radiation Site NPL #8
Dayton Township, LaSalle County, Illinois
Fox River State Park

Dear Mr. Muno;

I felt it was necessary that I write you directly after receiving correspondence from you regarding NPL 8, one of the Ottawa Radiation Area owned by the State of Illinois and hearing a report from John Comerio, Deputy Director of the Department.

Significant attention has been given to future use of the state-owned property on the Fox River. As you know, in time past the property was designated as the Fox River State Park and that it is, now largely unused. Though there are no immediately plans for the redevelopment of recreational resources and opportunity at the property, I am writing to let you know how I see this property fitting into the future of North Eastern Illinois recreation.

Beginning in the earliest year of Governor Jim Edgar's administration, the Illinois Department of Natural Resources embarked on a program of trail development. Notable successes are the Illinois and Michigan State Trail that has an Ottawa Illinois component. The ultimate goal is to link state trails into a comprehensive system. The state owned property along the Fox River near Ottawa will be developed for recreation; the only question is when the development will be initiated.

Illinois' trails are not limited to the bike and hike paths that are now being constructed around Illinois. The State of Illinois began planning for canoe trails and enhanced river access in 1996. The Illinois Conservation Congress in 1997 recommended that the state develop canoe trails and Develop public access to water based recreation al opportunities. Our planning effort will complement the land-based system now in development. It is my hope to have the planning and conceptualization for the canoe trail system complete in this fiscal year.

A keystone of the canoe trails will be the Fox River. It is a major corridor to northen parts of the state and is heavily used by recreationists. Ottawa's location at the confluence of the Illinois and

Fox Rivers as well as the I & M Canal State Trail means that the state property in the area must be considered for future development and public use.

Concomitant with the canoe trail development will be the construction or renovation of ancillary resources intended to enhance recreational opportunities at the property. These include campgrounds, picnic facilities and other supporting structures like showers and toilets. Through DNR is moving away from having staff residences on park property, it is reasonable to assume that there will be a need for buildings and development that entail excavation of soils. Furthermore, staff may be permanently assigned to the park as demand for services increases.

We are now faced with the requirement that remediation activities at NPL #8 be conducted to maximize the state's flexibility because of these plans for recreation and trial development. In my earliest correspondence to the USEPA I stated that the site must be cleaned up to assure the public safety. My position has not changed.

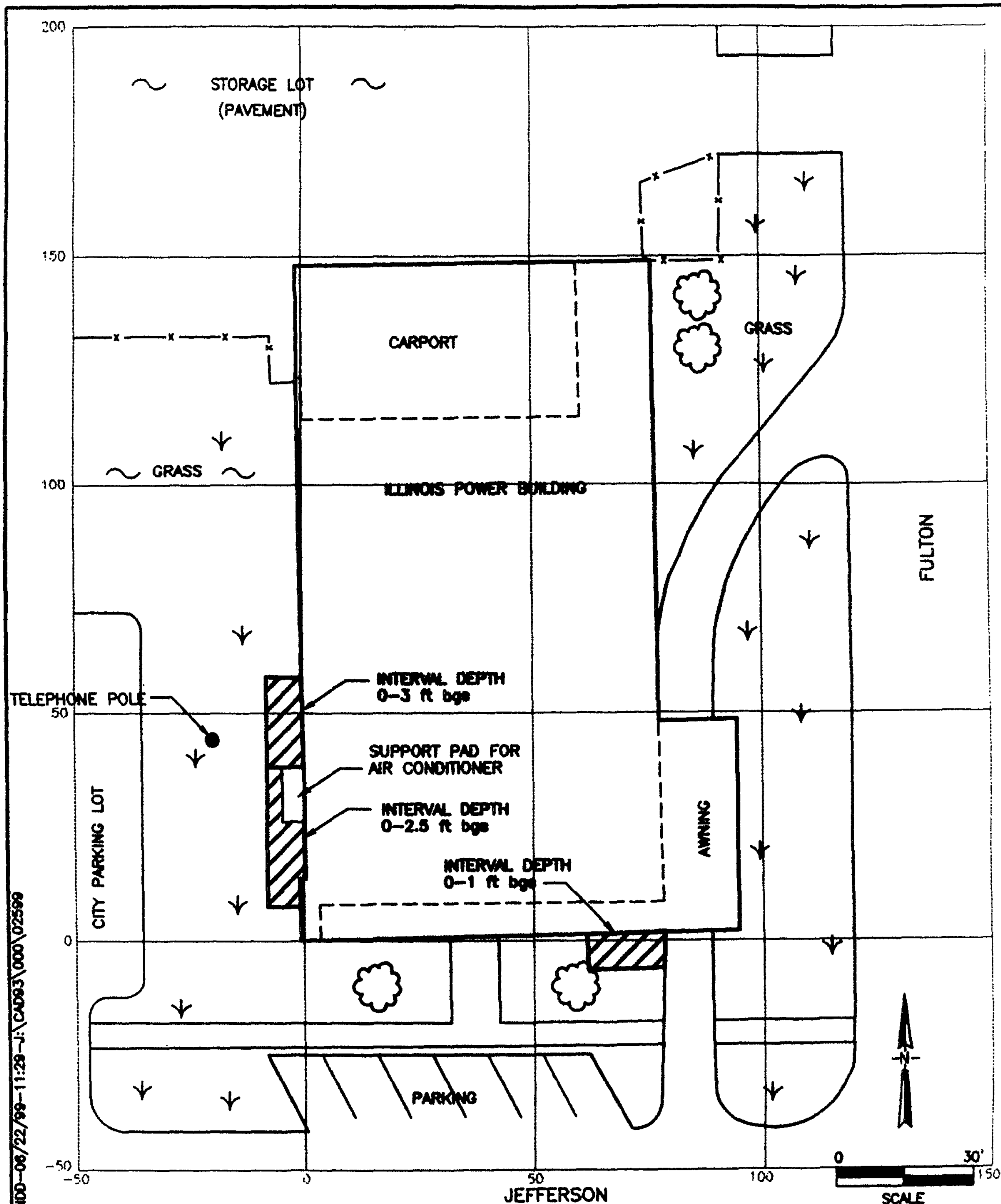
Sincerely,

Brent Manning

Brent Manning
Director

cc: Al Grosboll, Governor's Office
Beth Wallace, Assistant Attorney General

OTTAWA1.WPD



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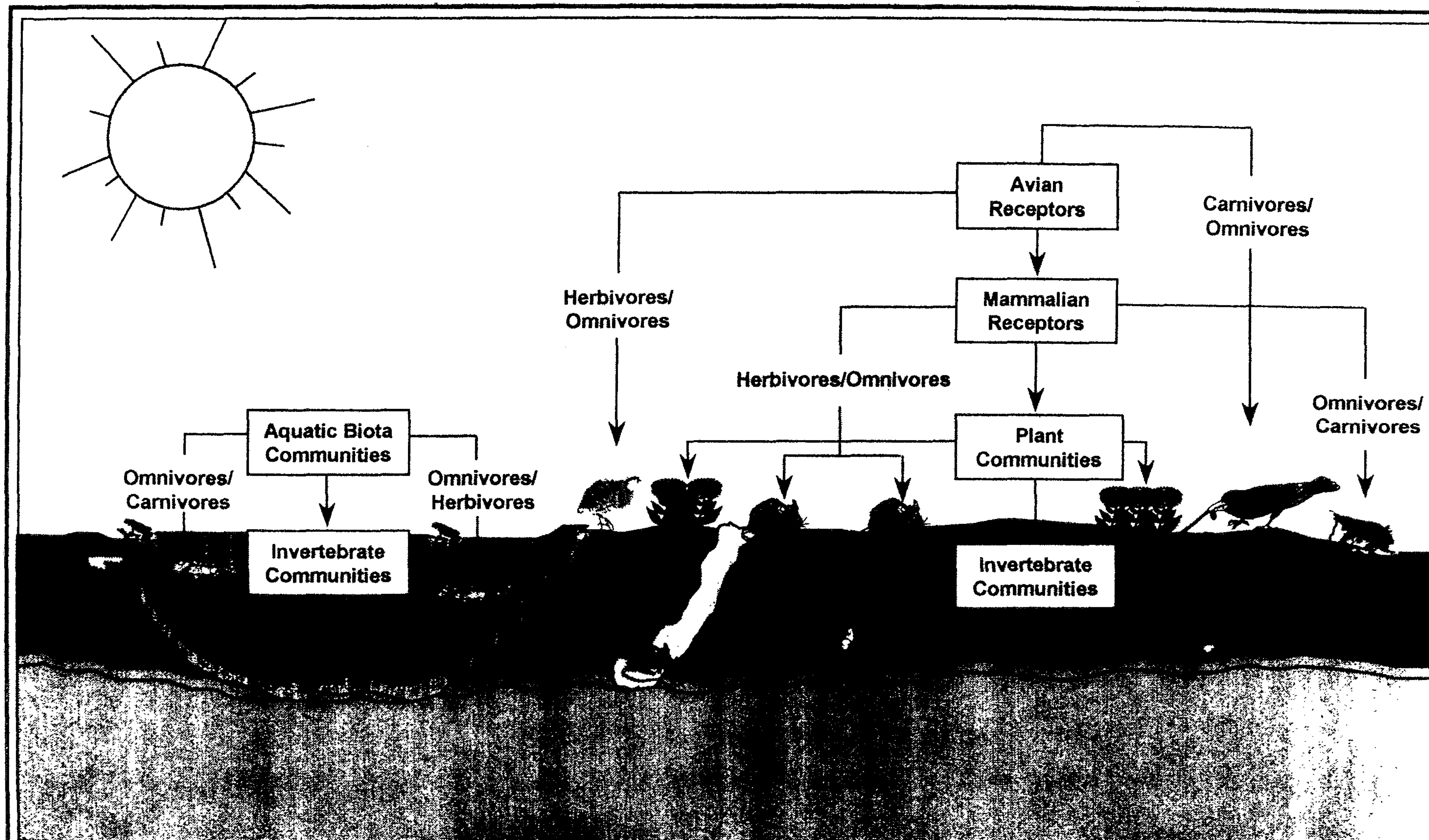
LEGEND

▨ SOIL CONTAMINATED WITH RADIUM-226

FIGURE 6

RESPONSE ACTION CONTRACT U.S. EPA CONTRACT No. 68-W7-0026 WORK ASSIGNMENT No. 011-NSBN-059Z DOCUMENT CONTROL No. RFW011-2A-ACMG	SITE MAP ILLINOIS POWER SITE Ottawa, Illinois



Ottawa Radiation Areas

Receptor and Community Feeding Relationships Model